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Ministério da Agricultura, Pecuária e Abastecimento
Secretaria de Política Agrícola

Esplanada dos Ministérios, Bloco D, 5º andar
CEP 70043-900 Brasília, DF
Fone: (61) 3218-2505
Fax: (61) 3224-8414
www.agricultura.gov.br
spa@agricultura.gov.br

Empresa Brasileira de Pesquisa Agropecuária
Secretaria de Gestão Estratégica

Parque Estação Biológica (PqEB), Av. W3 Norte (final)
CEP 70770-901 Brasília, DF
Fone: (61) 3448-4159
Fax: (61) 3347-4480
www.embrapa.br
Marlene de Araújo
marlene.araujo@embrapa.br

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A new agriculture for all Brazilians

Zander Navarro¹

There is a virtuous and happy coincidence among the celebrations of the 150 years of the extraordinary institutional history of the Ministry of Agriculture, Livestock and Food Supply (Mapa), and the characteristics and productive results of the agricultural sector of this decade. The conclusion of this period brings a series of noteworthy advances that add to promising initiatives, all of which seeking to base the economic activity on new pillars that can transform Brazilian agriculture into a paradigm of sustainable production.

In studying the prior period, we can observe that Brazilian agriculture has shown a robust performance repeatedly breaking production records, where productivity and investments are continuously growing. In effect, over this last decade, public resources for farming and animal husbandry production grew over

five-fold, where we supply both the Brazilian market and export to nearly two hundred countries. Hence, Brazil's economic importance is assured as it becomes the strongest supplier of agricultural products from tropical agriculture.

The future is also promising. The recently-launched ABC Program with its five action lines provides resources, institutional support and favorable funding conditions, not only with the purpose of additionally improving Brazil's agriculture competitiveness, but also backing the construction of a sustainable development standard that fosters the creation of a true low carbon agriculture in Brazil. Those are the robust and sound roots for a new agriculture that will give the world a more consistent road to align production needs with the crucial environmental requirements of the present days.

This article was translated by On the Road Idiomas Ltda., and not revised by its author.

¹ Associate professor at the Department of Sociology of the Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, RS, and visiting researcher at the Institute of Development Studies (IDS), England. Currently assigned to the Strategic Management Advisory Office at the Ministry of Agriculture, Livestock and Food Supply (AGE/Mapa). E-mail: z.navarro@agricultura.gov.br

The 150 years of the Ministry of Agriculture, Livestock and Food Supply

Aércio S. Cunha¹

With the advantage of 150 years of hindsight, it can be affirmed that the Ministry of Agriculture, Livestock and Food Supply (Mapa) has been an important player in the history of the development of Brazilian agriculture. It was not the leading actor – farmers have always performed that role. For sure it was not the director, for countless times it asked: what am I doing here? Nor was it the narrator, because this is a story where the epic plot is written as the episodes enfold, sometimes as a drama, sometimes as a tragedy, and even as a comedy. What can be affirmed is that the ongoing episode would be more tragic if it were not for interventions made by the Ministry.

Explaining the role of the Ministry – to create and implement agricultural policies – is more difficult than it seems. The situation of agriculture and the context where it is inserted resembles, more often than not, a kaleidoscope; they change each time they are observed, and each time they change the Ministry has to both adjust policies and the way how it operates, and often its very framework.

At the height of the import substitution industrialization, the goal of the Brazilian economic policy was to extract resources from the rural sector to fund industrialization. The Ministry had to keep alive the “goose that lays the

golden eggs.” During the decades of super-inflation, when agriculture was asphyxiated by inflationary taxes, the Ministry performed as a juggler, handling each harvest as if it were the last. For lack of a more efficient instrument, it compensated inflationary taxes with abundant credit that compensated for the inflationary depleted value of currency and with the implicit subsidy of fixed nominal interest. At that time, urban-industrial expansion led to the growing demand for food, to which the oil crisis added the demand for alcohol fuel. The ability of agriculture to meet both demands was stretched to its limit. Agriculture had to guarantee that the terms of exchange did not turn against industrialized products. There was the fiasco of the first attempts to occupy the Amazon frontier with agriculture and the successful conquest of the Brazilian Cerrados. With stable economy and free trade, technologies that had been put on hold were put into practice. From then on, extensive growth gave way to productivity gains and a new growth of development began – intensive growth.

In the period addressed by this overview of the recent history of agriculture, the role of agricultural policy wavered between fighting scarcity and managing the surplus. In the 21st century, new demands were imposed on agri-

This article was translated by On the Road Idiomas Ltda., and not revised by its author.

¹ Legislative consultant at the Chamber of Deputies (retired) and visiting professor at Abraham Baldwin Agricultural College, Georgia, USA. E-mail: acunha@abac.edu

culture: on domestic, where it increased because of income distribution and the rekindling of agroenergy; and foreign demand boosted by the appetite of Asia, the Middle East and Russia – to mention only a few countries – for vegetal and animal protein. As demand increased, so did the “food inflation” at global scale, which was curtailed by the international financial crisis.

The lesson learned is that agriculture in our agricultural country depends on the rest of the world, more than we would like to believe. We depend on foreign markets to sustain the price of farming products in the domestic market and to supply our own need of fertilizers, agrochemicals and veterinary products. Brazilian agricultural production exceeds by far domestic consumption, and our need for fertilizers is greater than what we are capable of producing. Increased supply of nitrogen and phosphorous depends on new public and private investments, while the potassium reserves in place are still quite limited. We need a new Mining Code that subsidizes research and is conducive to exploiting new deposits. The supply of these products is relatively rigid to prices. With the last crisis we finally realized that farming production can only grow at the expense of higher private and social costs. Deciding how and who will foot the bill is the core of the ongoing debate about the environmental legislation.

There is no country in the world that can match Brazil's potential for growth in agricultural production. Challenge posed on the agricultural policy for the next decades is to ensure that this potential comes true, conditioned to the maintenance of external competitiveness within the context of the growing marginal costs, greater social demands and pressure for environmental sustainability in agriculture. Record-breaking harvests, exports and investments in machines, equipment and high-lineage animals have put Brazil in the position of an important player in the world market. Reasons for optimism abound.

We have changed our perception, and optimism should be taken with a grain of salt. Farming is doing fine, but farmers are struggling.

The indebtedness of agriculture is told by the chapter, where a large number of farmers are going bankrupt. A negotiation is hardly concluded before the speculation about the amounts of the next negotiation begins. Bankrupt farmers are the symptom of unviable farming. But is that really true? This affirmation needs to be proven. Part of the debts was inherited from the past. Agriculture may be profitable, but not enough to do away with the inventory of accumulated debts. One way or another, there is no doubt that many sectors of agriculture can only survive thanks to public support. With the decreasing profitability of each unit, only those that manage to increase volume yield will survive. Concentration of land is growing. In many regions, there is no need for statistics: one can see clearly that farmers are becoming poorer by the day. Brazilian agriculture is undeniably dynamic. Such dynamism is manifested also by the intensity whereby the “creative destruction” process (SCHUMPETER, 1975) to which agriculture is submitted manifests.

Until a few years ago, the problems of agriculture were those typical of a “small country.” Prices were mere parameters to which farmers have to adjust themselves. From now on, our problems will be more and more like those of a “big country.” If whatever is going on in the rest of the world has repercussions here, whatever happens here will have repercussions outside... And the eyes of the world will be upon us.

The very subjugation of agriculture to the market's free trade has given rise to new questions. The Ministry is in doubt about its role under the new scenario of free and global markets. That doubt was clarified when the Ministry realized that markets are distorted, negotiations to align them are not going anywhere and that mechanisms to punish violators – as in the case of cotton – hurt the perpetrator as much as the victim. The option to “pull out the oars and cross arms was discarded.”

It is said that open trade fosters growth; however, the mechanisms through which this occurs are not so clear and it was some time be-

fore Brazil understood them. If on one hand free trade offers the promise of more markets, on the other it exposes producers to merciless and also unfair competition. This freedom has impacts on distribution. When cornered, producers have to face the dilemma of fighting competition in their own game or to abandon the match.

If they choose to fight competition, greater productivity and efficiency should be the objectives for agricultural policies, where consequently there will be a reduction of costs, of the management of risks inherent to that activity, and improved quality of products; in short, competitiveness of Brazilian agriculture will be advanced. And while that takes place, poverty will be reduced and the environment protected. The yardstick used for assessment is how close to these goals policies can take us.

The first question asked is: to what point is the Ministry equipped to implement those policies? If an expert were asked about the main problems of Brazilian agriculture, he or she would not hesitate in naming the following ones as the most significant: non-aligned exchange, infrastructure bottlenecking, legal insecurity related to environmental, labor and land legislation, and regulation costs that are implicit in legal norms. However, few of the issues that affect farmers pertain to Mapa.

Attributions that are inherent to the agricultural policy, and hence to the scope of Mapa, were allocated to different governmental agencies. There are two "Ministries of agriculture": one pertains to business agriculture, and the other to family farming. That latter is responsible for funding actions and fundamental tasks, i.e. land legalization. Fishing and aquaculture that used to be under the Ministry of Agriculture – Superintendency for Fishery Development (Sudepe) –, were transferred to the Brazilian Institute of Environment and Renewable Natural Resources (Ibama), and later to a special secretariat, only to be allocated to the Ministry of Fisheries and Aquaculture, where finally these activities and their development were promoted to the first level of concern. The policy for

planted forests is held by the Ministry for the Environment, which is more focused on excluding areas for farming than to developing production ways compatible with sustainability (although it is common knowledge that the greatest harms posed on the environment are the consequence of inadequate practices). The Ministry of National Integration is responsible for irrigation, focusing more on engineering projects than in taking water to plant roots. Fundamental services, such as rural extension, are state responsibilities, while most health protection actions were decentralized, especially after Decree no. 5,741, of March 30, 2006, was enacted, which sets up the Unified System to Monitor Agricultural Soundness (BRASIL, 2006).

Research on agriculture falls under the Ministry's organizational chart, which are carried out by the Brazilian Agricultural Research Corporation (Embrapa), empowered with considerable financial and administrative autonomy; supply is undertaken by an autarchy called the National Food Supply Company (Conab). Other than that, it is safe to say that Mapa is left with few attributions, like drafting norms for the quality of products and inputs, and to monitor if those norms are being complied with. These attributions and other ones under its responsibility should not be taken lightly. The substantial improvement of the quality of Brazilian milk, beef and coffee is the result of the work endeavored by the Ministry. The relevance of those functions is also reflected in the failures. The "import" of pests bears witness to the vulnerability of the surveillance system for agriculture. Summing up, one way or the other, regulation and monitoring actions have become the trademark for which Mapa is nowadays acknowledged for.

In principle, it cannot be said that a management system concentrated in a sole Ministry of Agriculture is preferable to the other option, such as the current model, where functions are divided among different agencies. However, it is important to know the reasons that led to the current management organization, and espe-

cially to know the implications entailed for the efficiency of public administration.

First let us study the causes. The segmentation of public administration among the different agencies is up to a certain point the reflection of the ambivalence of society to the role of the State in economy. Should Brazil adopt or not an "agricultural policy" that encourages farmers' rights by granting credit lines, subsidies, guaranteed prices, production insurance and any other type of market reserve? Should stimulus policies be general or discretionary? Should the focus be on family farming or on large agricultural companies, the production of food and environmental conservation should be on the short or the long term? Where the answers to these questions are very different, the current model of management organization is a mean to curb conflict, at least within each agency.

There is another probable cause that is less noble. The multiplication of public administration agencies can be a means of providing political support to political party colligations. It is part of the "power game." In that being the case, administrative efficiency is sacrificed due to the country's deficient political organization.

In relation to consequences, the segmented administration system tends to hinder the coordination of policies and in that it fosters the opposite: the subordination of some policies to other ones. Since the strengthening of the industrialization process in the post-war era, agricultural policy is subordinated to the industrial policy, and both to the macroeconomic policy. Producers nowadays believe, and not without reason, that the agricultural policy is subordinated to the environmental policy. From the agronomic point of view, agricultural production in Mato Grosso is a success case. The difficulty is to get the production out. Agricultural policy went one way and transport went another. Agricultural modernization is a synonym of work productivity increase and workforce clearance in every other country in the world. If that is a fact, then why did the educational policy fail to educate workers to live in urban centers where by all means they would have to move to?

The second question is whether Mapa has adequate instruments in place to carry out the objectives under its policy, other than command and control. For many years, minimum prices and rural credit were the most important instruments for agricultural policy. Over the last decade, the former was considerably improved when it was supported by the market, instead of trying to replace it. Hence, the cost of policy was reduced and its efficiency increased. On the other hand, rural credit policy did not change much. Harvest plans boasted at the beginning of each agricultural – year are nothing but a quota regime – credit lines that are controlled with rigor.

Economists are direly opposed to quotas, which is an arbitrary manner of allocating resources. They are faulty at birth. However, farmers are addicted to that regime, and because the Ministry lacks a better solution, it does not dare to "fix what ain't broken." Once, when the author of this text asked a colleague of renowned competence if he had any idea about the flexibility of rural credit demand to interest rates, the questioned individual reacted as if he were talking to someone from Mars. The possibility of a farmer seeking credit in the free market is simply unheard of – the hypothesis of economic unfeasibility in farming is implicit. We should rather examine carefully the hypothesis of the economic unfeasibility of Brazilian agriculture, and in that it cannot be rejected, to seek the causes of the presupposed unfeasibility.

One of the factors that hinder agriculture's profitability is so blatantly clear that the analyst needs not delve deeper into the issue, e.g. productivity risk. Based on the assumption that the agricultural policy suffers from the lack of instruments, the conclusion is that rural insurance contingent can be the missing instrument to finally deregulate agricultural credit. Agriculture is particularly sensitive to macroeconomic imbalance; insurance may render it competitive under an unfavorable outlook. That is common knowledge. And that insurance will be an important step forward is unarguable.

If policy instruments are few, then they must be fully taken advantage of. The way how this can be done is common knowledge: by coordinating policies and setting up long-term objectives. The Ministry responding to crisis is one thing; formulating policies that are coherent with the stipulated objectives and to handle the instruments adroitly, is yet another. If rural credit and insurance policies are aligned to meet risk reduction, environmental protection, productivity increase and price instability reduction objectives, the result will be by far superior compared to using these policies. Isolated policies are like crutches; combined they can revolutionize agriculture.

When the government realizes that the director's chair is not too big for Mapa, it will see that writing the plot is by no means out of its reach.

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The agricultural policy in Brazil

A long-term outlook

Charles C. Mueller¹

Introduction

In 1860 – 150 years ago – Imperial Decree no. 1,067 created the Secretariat for Agricultural Affairs, Commerce and Public Works (the Secretariat for the sake of brevity), the organization that was the embryo of the entity that after being given different names was finally called the Ministry of Agriculture (MUELLER, 1988b). There are two facts that stand out regarding this event: the first is that in the scenario of primary export economy it took almost until the late 19th century before an organization dedicated to Brazil's dominant sector was created; the second is that when it actually happened, Agriculture had to share the space with Commerce and Public Works. Furthermore, it is worthy of notice that when the Secretariat was created, Brazil was at the early stages of the first coffee exporting boom, but the prosperity ensuing from that practice depended very little on the Secretariat and its successors. According to (DELFIM NETTO, 1979), the expansion of coffee plantations in the interior of São Paulo during the second half of the 19th century and the early 20th century took great advance from public power actions, such as immigration schemes and subsidies to invest on railways and ports. And starting in 1906, coffee plantations were backed by the public sector to hold prices whenever there was a super-production and a strong pressure to bring down

the prices abroad. However, the Secretariat and the succeeding organization did not play an important role in creating and executing the coffee policy. Decisions were made at the higher levels of the Imperial administration, and later from the administrations during the First Republic.² They were made by organizations from the central and provincial (state) governments that were part of the government's economic area. This segment ruled over public budgets, currency and credit, as well as the exchange rate and commercial policy, for which it had the necessary resources and instruments in place to meet the demands of the coffee producers.

In 1906, during the republican period, the Secretariat became the Ministry of Agriculture, Industry and Commerce, although it still shared space with other sectors. The Ministry of Agriculture, formally in command of the entity called the agriculture public sector was only created in 1930s and reformed in 1934 (MUELLER, 1988b). At the same time, centralism that prevailed after the Revolution of 1930s caused the decline of the influence of the states on the agriculture public sector. Since then, and after undergoing a series of changes both of name and attributions, the Ministry remained formally in the command of the Brazilian agricultural public sector.

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¹ Professor emeritus of the Department of Economy of the University of Brasília (UnB), Brasília, Federal District. E-mail: cmueller@unb.br

² During the I Republic, the coffee policy often involved both the government of the state of São Paulo and the federal government.

What is the role of the agriculture public sector? In broad general terms, there are two distinct areas in which it should perform:

- Technical area (normalizing vegetal and animal production; development, research and extension actions, as well as actions in the defense of agriculture).
- Formulating and carrying out macro-sectorial actions and policies for agriculture and obtaining resources and managing stimulus and incentives relevant to agriculture.

In Brazil, the participation of the agriculture public sector in both fields has been quite varied since 1860. In the early years when the agriculture public sector was being implemented, its field of action was not limited to the aspects under area I; being in the command of area II tended to remain – if not legally, at least de facto – within the scope of the government's economic area, with the reduce participation of the agriculture public sector (MUELLER, 1984, 1988b).

Agriculture economists tend to see that evolution as spurious, resulting from the poor assistance given to agriculture and as a consequence of the lack of enough resources to better equip the agriculture public sector. One such example is the assessment of Brazilian agricultural policy carried out by Gordon Smith (SMITH, 1968). He focused in the two decades that followed the end of World War II – a period of intense urban-industrial expansion – and was surprised with the lack of strategy for Brazil's agricultural development; he identified incipient agriculture credit and minimum price policies, both of which were granted to influent agriculture segments with great distortion in their allocation and distribution. Smith justified this state of affairs to the lack of training of technicians from the agriculture public sector. This factor would have hindered the sector from creating consistent agriculture policies supported by guidance provided for economic theory and other fields of science.

For critics like Smith, criteria for reforming Brazilian agricultural policy should include aspects of the social wellness paradigm, whereby the formulation of efficient policies – for any are – consists in choosing from the alternatives at hand the one that fosters the greatest social wellness. Policy issues should be addressed as if it were possible to build in a dispassionate and objective manner, a solution of maximum social wellness. Those issues acknowledge that in real life a given policy issue tends to involve demands and pressures posed by stakeholders, but they care deemed spurious given they are conducive to the implementation of policies that only improve the wellness of a small number of individuals, and more often than not, reduce the wellness of a great part of society. These critics believe that the ideal situation would entail the waiver of public policies. They are only justified because markets not always operate under ideal terms; there are externalities, uncertainties and distortions that need to be eliminated or reduced. That is the real purpose of public policies, but they should be formulated based on criteria for the social wellness theory.

Heady (1962) gives a significant example of that approach. This author – who is an expert in the field of agricultural policy – identified that there are powerful stakeholders in every country that force the adoption of measures that will benefit them, and that they do not take into account the ensuing negative impacts. However, in his opinion,

[...] the different values and objectives in place [...] do not hinder the development of policies that are consistent with the optimization of a social wellness function (HEADY, 1962, p. 308-309).

Thus, the wellness theory provides a scientific criterion,

[...] a set of concepts that enable the recommendation and assessment of policies within a society-based or comprehensive community context (HEADY, 1962, p. 308-309).

The agricultural policy should be carried out based on that criterion; otherwise it is faulty and must be modified.

Gordon Smith would agree with this outlook. In his opinion, the situation of Brazil at the time of his assessment was becoming more serious due to that lack of technical base for the agriculture public sector. Hence, government's economic area – better structured in technical terms – had to command the aforementioned field of operation II of the agricultural policy. However, given that he was focusing especially in urban-industrial development strategies, he only addressed the agricultural policy occasionally and superficially. Hence the errors and insufficiencies that he observed.

However, it should be noted that after the above-mentioned study carried out by Gordon Smith was published, technical training for the agriculture public sector underwent significant improvement. There were a series of reforms, new organizations were created, and the sector started to hire highly trained technicians and to encourage members of their technical teams to take post-graduate courses in reputable universities. Hence, the sector was prepared to operate in both fields of the agricultural policy; however, the scenario above did not change dramatically. There were some advancement, for sure, particularly in the research and technological development area for agriculture; from the early 1970s there was installed technical competence to guide the two most important quantitative policies: the credit policy and the minimum price policy. When the National System for Agricultural Credit (SNCA) was created the field of scope of the credit policy increased significantly; the same thing happened with the minimum price policy after the comprehensive reform of the Production Funding Commission (CFP) (COELHO, 2001; WEDEKIN, 2005). However, in the light of the actual participation of the agriculture public sector, particularly in relation to the implementation of parameters for those policies, it is noted that it did not perform as expected given the advancement of technicians from the agriculture public sector. The interference of the economic area remained significant and often dominated the process (MUELLER, 1988b).

Some important concepts

To give more substance to the discussion, we will explain some of the above-mentioned concepts and include additional ones. We have already drafted the criticism to the limitations of the convention public policy theory, but we have yet to provide an alternative approach. To that end, we have taken into account the creation of agricultural policies that combine two basic dimensions: the dimension of rationality emphasized by the economic theory, and the fundamental dimension of power that is considered spurious by the theory. The latter is associated to the performance of important agents that are interested in the decision-making aspects of public policy. Hence, public policies fundamentally ensue from the inter-relationship between the coalition in power – the government – and influent social segments with interest in certain policy issues, usually organized as sectorial policy networks.

As a rule, coalition in power (government) has two core objectives: to realize a certain outlook of a good society and to maintain or expand its control over power. On the other hand, influent social segments with which the coalition interacts also has its own concept of a good society – that may or may not coincide with the coalition's concepts – and that are reflected on their demand for policies (MUELLER, 1982). Both the coalition in power and influent agents have economic, political and social resources. The economic theory for public policy emphasizes economic resources and ignores the other two resource categories that are fundamental for the creation and implementation of policies: the political and social resources. These include authority, influence, status, prestige, coercion (or the power to suspend coercion), information, violence (or the ability of suspending violence), legitimacy, recruitment and support. In the assessment of how public policies can be created and modified in societies somewhat complex, these resources play an important role in the policy formulation process, and as such should not be ignored.

The coalition in power uses its resources to reach two basic objectives, and with this purpose in mind it deems it is important to be able to rely on resources controlled by important agents or sectors. These, in turn, are interested in accessing resources from the coalition in power. Thus, the creation of policies can be considered the result of a process whereby economic, political and social resources are exchanged with the coalition in power and sectors of influence. Via this exchange, both the coalition and the sectors of influence aim at gaining advantages. The latter hopes to increase their wellness, and the coalition in power wants to further the realization of their outlook of a good society, maintaining or expanding their control over power.

At this point, it is pertinent to consider the creation of public policies as a dialectic process (MARSH; SMITH, 2000). Some segments – usually coalition in power – start the proposal for a policy, but sectors of influence may have their own vision that is different. In that they have the power to change it, they endeavor to improve the proposal or even to repel it; and if improvement conditions are in place, they try to draft a new proposal. Sometimes there are deadlocks that can persist for a certain period of time. In these cases, the dialectic cycle is obstructed.

Another important concept is the network of policies – entities that can influence the creation of policies (MARSH, 1998). A network of policies is not a public sector organization or a thematic gathering of public agencies. These thematic agencies exist and can be outstanding in a network of policies, but private agents – sectors of influence – also participate and quite often in a decisive manner. Usually, the latter have well-defined viewpoints in terms of proposals and the need for policies, and have resources in place that can influence the creation of policies.

Networks of policies are usually not formal organization, although some organizations

of this type can be identified with the network and even participate in its command. They take advantage of public sector organizations – regardless of their formal area – that are capable of meeting their needs. For example, if an organization is not labeled as agricultural but meets the requirements of the network of agricultural policies more efficiently than agencies under that label; this does not prevent it from participating in the network. There are different categories of networks of policies; some are flexible and tend to adapt to the changes of the political environment. However, some barely change – they are the networks of strict policies. A characteristic of this type of network is the strict control of its policy area, which is maintained under most circumstances.

As shown above, sometimes dialectic cycles are obstructed. This is frequently perceived as the result of lack of political goodwill or of poor management skills from the public sector; however, what usually happens is that a given network of policies (usually a strict network) is capable of preventing the dialectic cycle from being completed. Furthermore, in terms of certain public policies, there could be a clash of two powerful networks of policies that have different outlooks, causing a paralyzing effect. Paralysis is not always the result of a clash, as one of the networks of policies may win the fight; however, in some cases the battling forces are so strong that the outcome is the obstruction of the cycle.³

Furthermore, the assessment of the creation and implementation of agricultural policies in Brazil during certain periods requires that public sector agents be taken into account, which operated as the links between State organizations that are responsible for putting some policies into action, and sectors of influence interested in certain decisions. They are generally techno-bureaucrats that can operate in transmitting the demands of the sectors of influence

³ Two recent examples: the clash between the environmentalist network and the agricultural network about the control of authorizing transgenic products, won by the latter (MUELLER, 2009); and the clash between the environmentalist network and the agricultural network about the proposal for amendments or adaptations of the Forest Code, yet to be solved but that has elevated potential construction.

at levels of command within the scope of the coalition in power. These liaison agents tend to become important in the creation of policies within authoritarian societies. In these, the mechanisms to transmit demands do not operate in a transparent manner, and the networks of policies with interest in certain actions exert pressure, usually concealed, and involve linkers with the purpose of obtaining favorable policy decisions.

A panoramic outlook of the agricultural policy evolution over the last 150 years

From 1860 to the end of World War II

Based on the aforementioned elements, it is easy to clarify the apparent paradox of the paltry performance of the Secretariat for Agricultural Affairs, Commerce and Public Works that was created in 1860, in an imminently agricultural country. To begin with, one should have in mind that extreme centralism and the absence of a strategic vision of the Imperial regime, what explains the small emphasis placed on agriculture. However, we learned that the government provided fundamental support to important segments of the primary-exporting economy, notably coffee in the Southeast region and sugar in the Northeast. This support resulted in the operation of specific networks of policies effort both areas. The performance of the network of coffee policies is told with abundant details by Delfim Netto (1979); fundamental policies for the sector, of incentives to railways construction, and with the last throes of slavery, the encouragement of immigration, emanated from the high levels of Imperial administration and had little to do with the Secretariat. A similar situation occurred with policies that supported the sugarcane-based economy.⁴

The proclamation of Republic in 1889 and the strong decentralization introduced by the First Republic caused those policy networks

to involve Provincial governments to meet their needs. In the early 20th century, a reform extinguished the Secretariat and created the Ministry of Agriculture, Industry and Commerce that was maintained until 1930s. The institutional changes introduced by the First Republic weakened central government, which ended up taking on a minor role, at least concerning the execution of policies of interest to coffee oligarchies. The network of coffee policies – then comprising segments from farming, commerce, product financing and organizations of the government of São Paulo, was trained to perform efficiently, including to obtain external funding and the successful creation of complex schemes to hold the price of coffee. At that time São Paulo operated as a quasi-independent unit; central government acted only as a funding player. And for this policy, the Ministry was irrelevant.

It should be noted that the coffee network was able to value the technical actions of the aforementioned Area I. However, when it identified the agroecological specificities and the inadequate equipping of the federal agriculture public sector, it then demanded and supported the initiatives of the government of São Paulo for this area. As a result, technical and scientific organizations were set up, such as the Agronomy Institute of Campinas and the Biology Institute, both of which were very important for the technological development not only of the coffee sector but also of other agriculture segments of São Paulo (PASTORE et al., 1976).

With the Revolution of 1930, which concluded the First Republic, Provinces that had an exaggerated autonomy were once again subjugated to central government. As a consequence, the scope of influence of the networks of sugar and coffee policies became weaker. In relation to the coffee network, since the maintenance of the product's price was deemed fundamental to prevent the significant reduction of the source of the country's hard currencies, central government gave emphasis to an extremely ag-

⁴See Delfim Netto (1979), and Mueller (1983) (chapters II and III) for the network of coffee policies; and Szmrecsanyi (1979) for the sugar network.

gressive coffee policy that entailed purchasing great amounts of coffee surplus and even burning some 70 million bags of coffee during the 1930s. It was fundamental to obtain hard currencies for the policy that gave priority to paying the foreign debt until 1937, and this was the objective that charted the coffee policy. However, if the policy helped the sectors of influence of the coffee network to dodge bankruptcy, the relative loss of power after the Revolution led them to bear the burden of a large part of the costs. Prices were maintained, but the policy shifted its focus and decreased its domain over the coffee network (DELFIN NETTO, 1979; MUELLER, 1983).

The network of sugar policies also had to be aligned to policy changes after the Revolution of 1930. However, given the important role played by the sugar economy in some parts of the Northeast and the scenario where demand for sugarcane suffered a great fall due to the Great Depression of the 1930s, government put in place a scheme to support and intervene that culminated with the creation of the Sugar and Alcohol Institute (IAA), which was an organization fully dedicated to control the sugar network, an activity that lasted for many decades (SZMRECSANYI, 1979).

A new network of product policies was created in the 1930s – the cotton network. The development of varieties of cotton aligned to the agroecological conditions of São Paulo, the gradual clearance of land that used to be taken by coffee plantations from the mid-1930s and the support given by federal government – via external negotiations – gave rise to foreign markets, which added to the expansion of the domestic market fostered by the growing textile industry. Thus, there was a great increase of cotton production and the creation of a network of policies for that product in the Union of Cotton Farmers of São Paulo that became the channel for the demands made to the cotton sector (MUELLER, 1988b).

And what about the other segments of agriculture? From 1930 to 1945, the production

of crops for the domestic market had a good performance. That resulted in substituting food imports facilitated by the approval of production resources that used to be allocated to export crops and stimulated by a captive domestic market, consequence of the decreasing importing capacity of that time. It had little to do with the performance of the agriculture public sector (MUELLER, 1983). Actually, despite the reform of the early 1930s that dismembered the “agriculture” segment of the do Ministry of Agriculture, Industry and Commerce to create a Ministry of Agriculture, the aforementioned measures called for product policies originated from the government’s economic area, where the Ministry of Finance had a strong participation. Because of the weakening of the agriculture public sector, the first agriculture minister Juarez Távora – one of the “lieutenants” that led the Revolution of 1930 – soon stepped down from the position (MUELLER, 1988b).

With the coup that created the New State dictatorship and then with World War II (1939–1945), where Brazil also joined, the first steps were taken to adopt an autarchic development model based on the import substitution industrialization. This changed central government’s perception of the roles of agriculture and especially of the implications of the crisis in supplying, which led to the creation of the embryo of a agricultural credit policy, together with the Agricultural and Industrial Credit Portfolio of Banco do Brasil; and with the creation of the Commission for Production Funding, a more formal and effective embryo also came to be – the minimum process policy (MUELLER, 1984). However, these instruments were not put in place by the initiative of the agriculture public sector, but rather by segments of the government’s economic area and the military command that were concerned about the possible deleterious effects of poor agriculture performance caused by WWII restrictions. In relation to the networks of product policies during that period, they remained active and outside the scope of influence of the agriculture public sector. It should be noted the pressure posed by the coffee network to ensure

that negotiations would reach a better price for coffee in the United States, which was regulated as part of the war effort (ABREU, 1990).

Overview of the evolution of agriculture since the end of World War II (1945)

It is possible to establish, in general terms, the three most important stages of development for agriculture in that period (MUELLER, C.; MUELLER, B., 2006).

- From 1945 until the early 1970s: the phase of horizontal expansion that was a continuation of the evolution that had already been registered for Brazil during a significant period of time. During this period, the coalition in power prioritized development based on industrialization by substituting imports, which led to the high discrimination against agriculture (BACHA, 1975; BAER, 2002). Despite that fact, the agricultural sector had a reasonable performance, both in terms of generating income and production for the domestic market. That was possible thanks to the continuous incorporation of agricultural land (MUELLER, 1992) and the planting of coffee crops in the north of Paraná; the latter yielded as by-products the expansion of low-cost food supply. However, outside of São Paulo, Brazilian agriculture continued to show very low productivity indicators and with no trend to change (PATRICK, 1975).
- From the late 1960s until the mid-1990s: the phase of conservative modernization: a period of high modernization of the agricultural sector, but that was not preceded by effective actions to reduce the differences in access to land.⁵ The main focus was still put on

urban-industrial development, but it was obvious that the horizontal expansion model was dwindling and that the lack of a minimally structured horizontal expansion model would lead to supply crisis and lower generation of income from agricultural exports. In sum, the strategy adopted was supported mainly on qualitative policies, mainly subsidized agricultural credit – where in 1965 the National System for Rural Credit (SNCR) was implemented – and the policy for minimum prices, reinforced by technical equipping of CFP; both policies demanded heavy allocation of public resources (GOLDIN; REZENDE, 1993). However, for the long-term, technological development was furthered for agriculture via the creation of the Brazilian Agricultural Research Corporation (Embrapa), where incentives were put in place for agribusiness development. However, the modernizing strategy had a strongly interventionist stand in agriculture-relevant markets, with price control, market intervention (domestic and foreign) and exchange rates (DIAS; AMARAL, 2000). The development strategy employed by the military government using these incentives and via interventionism was to guarantee that agriculture performed in a manner that would lead to attaining the good society vision of the military regime (of "Brazil as a great country").

When the military regime ended, the agricultural strategy remained overall the same, but its goal was then to prevent agriculture from hindering the administration of the foreign debt. Another cause of concern was that insufficient agricultural supplying would lead to a possible higher inflationary pressure. This mindset prevailed in the

⁵ It should be noted that in the early days of the military phase, the Statute of the Land was approved, which was an instrument that held the potential to cause significant changes in how land was distributed in Brazil. But soon, powerful stakeholders exerted their influence to the point that even the idea of doing the land reform was shunned.

agricultural policy, bringing in its wake strong execution inconsistencies.

- From the mid-1990s until the first half of the new millennium: the phase when economy was open to foreign markets and the end of the interventionist mindset. In this phase, substantial adjustments were made to the agricultural policy, where less quantitative mechanisms were used, as they had proven themselves over time to be cumbersome and inefficient, and where there was a considerable reduction of interventions in agriculture-related markets (DIAS; AMARAL, 2000; REZENDE, 2003). The alignment took place gradually, with tentative and errors; at first it was turbulent, but different factors that took place at the turn of the millennium led Brazilian agriculture to a 5-year period of great expansion and modernization. Agricultural technological development and the consolidation of a modern agroindustrial segment were key-factors for the growing participation of Brazilian exports. It should be noted that the performance of agriculture occurred almost despite the lack of official support and incentives, as the State lost its capacity to intervene. In the period, the sector went as far as replacing resources from National Treasury with resources from other sources. Furthermore, some reforms gave rise to less cumbersome and more efficient mechanisms that provided official trading support.

The great expansion of the agricultural frontier in the Cerrado region was an important event during that phase, which was based on a highly technical and productive modern agriculture. Compared to the process frontier opening of previous times, skipping phases was a significant step (MUELLER; MARTHA JÚNIOR, 2008). Evolution had started in the previous

phase (REZENDE, 2003), but gained momentum in this last one.

The assessment in broad lines of the creation process of agriculture policies for these three phases is presented below.

The creation of agricultural policies in the horizontal expansion phase

In his comprehensive assessment of the evolution of Brazilian agriculture in the early 1970s and of policies adopted after World War II, William Nicholls (NICHOLLS, 1970) identified the sector's quite satisfactory performance within an environment where there was virtually no official support; the only exception he found were investments made to roads that were conducive to the strong expansion of the agricultural frontier. He was surprised that development strategists of that time did not use a bit of the creativity and effort they had been devoting to the industrialization strategy to build a more active and efficient agriculture public sector. Because he was an expert on Brazilian agriculture, Nicholls was convinced of the response potential for the sector to a minimally focused support framework. As it was, agricultural production would continue to grow as frontiers expanded, but productivity would be low.

This occurred in part because there was not an influent network of agriculture policies in place, without which the agriculture public sector was restricted to the mediocre execution of a few technical tasks. By the end of the period, a reform was enacted to provide the sector with the right conditions to improve its performance in yielding a better and adequate food supply and in the land reform program. The embryos of the current National Food Supply Company (Conab) and the National Institute for Colonization and Land Reform (Incra)⁶ were set up, but that took place on the dawn of the military coup of 1964.

Despite the lacking strategy and comprehensive network of agricultural policies in that period, networks of product policies remained

⁶See Mueller (1988b, p. 261-2). At that time, land reform actions were under the Ministry of Agriculture, where only a few results were observed.

active. The coffee network was able to set up the Brazilian Coffee Institute (IBC) that replaced the National Department of Coffee (DNC), shut down after the Getúlio Vargas dictatorship (DELFIM NETTO, 1979). The new organization was empowered to support coffee prices. However, the Institute had to balance meeting the needs of the coffee sector and the core objective of the government area that was in charge of the development strategy; it also backed the generation of income from hard currency in Brazil, which still depended to a great extent on coffee export. In truth, the coffee policy in the end was subordinated to the requirements of the economic area (BACHA, 1975), and the agricultural public sector had little influence over the policy for that product. A similar situation occurred with the sugar policy and the Sugar and Alcohol Institute (IAA), with the difference that it had almost total subordination to the Northeast sugar policies network. (SZMRECSANYI, 1979). The network of cotton policies continued to operate with a measure of influence over the minimum price policies and the cotton acquisition policy (OLIVEIRA; ALBUQUERQUE, 1977).

CFP, which carried out the minimum price policy, was part of the organizational chart of the Ministry of Agriculture, but resources allocated to that policy were controlled by the economic area; something similar occurred with the agricultural credit policy, executed by the Agricultural and Industrial Credit Portfolio (Creai) of Banco do Brasil. During the period, the agriculture public sector had a lukewarm performance.

The creation of agricultural policies in the conservative modernization phase

In that period, on the one hand the influence of the networks of products had a relative decline, and on the other, the emergency and strengthening of a comprehensive network of policies aimed at the part of agriculture undergoing fast modernization within the context of operating agroindustrial complexes. The comprehensive network tended to concentrate on two aspects: on actions to obtain income for

agricultural segments, pressed for favorable agriculture credit conditions and the minimum price policy; and trying to obtain some sort of protection against negative impacts on the sector of policies adopted to face the turbulent macroeconomic environment of that period. However, the interests of the economic area in relation to agriculture did not always coincide with the interests of important organizations from the agriculture public sector. The economic area was focused on urban-industrial modernization and on macroeconomic imbalances of that period, and the roles allocated to agriculture were of ensuring the domestic supply of food and agricultural inputs, and to help generating hard currency to attenuate the imbalances of the external sector. And that would have to be reached – in theory, but not always de facto – without high public spending, as the monetary imbalance caused by high public deficits was getting worse. Provided agriculture had good performance, the economic area tended to ignore the sector, but when that did not happen, aspects of the agricultural policy would become the object of their interests.

It should be noted that during that period, the minimum price policy stood out. Re-equipping CFP in the 1970s based on technical criterion enabled that organization to propose consistent parameters and to identify the need of resources for that policy. However, moved by objectives that more often than not were immediatist, the economic area that guided important segments associated to minimum price policy decision-making, notably the National Monetary Council (CMN) would frequently go against CFP recommendations (MUELLER, 1988a). Interventions of that nature made by the economic area were clearly a source of concern among agricultural policy managers, but they did not effectively command important instruments for their policy area. Rezende (2003) analyses with great propriety the state of aberration reached by the minimum price policy, which led to the establishment of huge and very costly public stocks of the product, part of which would go bad or were deviated for other purposes. His study also shows the role of the network of agriculture policies in the stage of evolution. By the

end of the period it was clear that the minimum price policy needed to be reformed, but that only happened in the next phase.

The agricultural credit policy was considered fundamental for the comprehensive network of agricultural policies. However, given that in the 1980s SNCR's performance was a growing factor that fostered the uncontrolled monetary policy, the economic area then started to limit the allocation of resources to rural credit – especially during times of accelerated inflation; but in other occasions, the threat of non-supply would lead the economic area to give in to the pressures of the comprehensive network, thus increasing resource availability for rural credit (DA MATA, 1982; GOLDIN; REZENDE, 1993). However, mechanisms that generated subsidies for the official agriculture credit were gradually deactivated. By the end of the period, it was obvious that the policy needed to undergo a reform; the heavy indebtedness of the sector was also causing much concern; during the period of accelerated inflation, that debit was diluted, but that came to a halt with after the Real Plan. The high rate of non-payments gave rise in 1995 to the first major recent negotiation of the debt incurred by the agricultural sector. (PARENTE et al., 1996).

We would like to point out the role of the liaison agents in the creation of the agricultural policies in the second phase. In the 1970s and in the early 1980s, while dictatorship was in full force, the creation of agricultural policies in Brazil involved the liaison agents, especially those from the government's economic area, which controlled important instruments to execute the agricultural policies. We saw that the allocation of resources and even the establishment of parameters for the agricultural credit policy and for minimum prices took place within the scope of the economic area, which made the comprehensive network of agricultural policies to turn increasingly toward the latter. Hence, the role of the liaison agents became more important; no matter how strong was the interest and collaboration of the agriculture public sector (the Ministry of Agriculture, Livestock and Food

Supply and governmental companies and autarchies that gave support to agriculture) to influential groups interested in certain aspects of the agriculture public sector, that would not guarantee that their demand for policies would be met. Under these situations, the liaison agents would be called in to report to the economic area the demands made by the agricultural sector. All that transpired during the military regime; the authoritarian nature of the coalition in power hindered the reporting that in democratic societies is made via regular mechanisms. However, it should be noted that the magnitude of the external crisis and uncontrolled inflation helped part of the mechanisms created in the dictatorship period, even after 1984.

In relation to the federal agriculture public sector, the modernizing mindset of that phase involved reforms made to Ministry of Agriculture and organization of the sector controlled by it, as well as the creation of new organizations. The most important initiative was for sure the creation of the Brazilian Agricultural Research Corporation (Embrapa) system for agricultural research that was granted adequate resources to operate. The aforementioned reform of CFP also took place, and Banco do Brasil, the main organization for granting rural credit, took on an outstanding role in the building of the comprehensive network of agricultural policies, although formally it was a function of the economic area (MUELLER, 2009). Many states followed suit. However, as already observed, these reforms and changes did not empower the agriculture public sector to take on the full command of the creation and implementation process of agricultural policies.

Agricultural policies in the period started in 1994: phase of opening of the economy to foreign trade and the reversal of interventionism from the previous strategy for agriculture

The reversal of the interventionist nature of agricultural policy started in the early 1990s

when Brazilian economy was opened to foreign markets, and became stronger with the stabilization provided by the Real Plan. The opening meant that Brazilian agriculture as part of agroindustrial complexes had more chances to export, but also had to face the competition of imported products. However, the risk of diminishing of internal crops did call any longer for the maintenance of high public stocks; furthermore, stabilization also exposed the high costs of policies, such as credit and minimum price policies from the previous period. That led to the creation of policies more aligned to the sector's modernization stage.

Despite the influence of the comprehensive network, less interventionist policies were created, but that still allocated fewer resources to the sector's influent segments. In spite of that, there was a considerable growth in production and productivity of the modernizing segments of agriculture; there was also a major growth of exports from those segments and agroindustries they were part of. The fruit yielded by the research system and the dissemination of agricultural technologies, commanded by Embrapa, which were decisive to overcome in 1995 the constraints created by the strongly indebted agricultural sector by providing a long-term negotiation of debts. Hence, there was fertile soil for the boost in investments and the expansion of agricultural production. As presented by Dias and Amaral (2000), the reduction of favors and subsidies was greatly compensated by the elimination of distorted interventions in markets relevant to agriculture in the previous period.

Measures to reduce the number or size of organizations of the agriculture public sector continued during the third phase, which started after the enactment of the Constitution of 1988; the decisive part played by Embrapa was never questioned, but this organization has been fighting to obtain minimally adequate funding. On the other hand, the two lines of traditional quantitative policies – of minimum prices and

agricultural credit – underwent major changes. It is a complex subject and for that reason will only be addressed in passing. Changes made to the policy to guarantee minimum prices in the 1990s focused on ensuring some manner of support to different agricultural segments, and to reduce the accumulation of large stocks by the government. That was reached via the Product Distribution and Selling Option Contract for Agricultural Products programs. These programs involve subsidies, but the requirements and expenses are below those involved when Conab buys products, and in creating large stocks as in the past (DEL BEL FILHO; BACHA, 2005). The comprehensive network of agricultural policies seems to be well adapted to the new model.

The credit policy underwent major changes and has been suffering great pressure posed by the comprehensive network. It is no doubt the biggest problem area of the agricultural policy. Agriculture credit policy, which used to be entitled to abundant public resources, started to change in 1986⁷ when it was terminated under the Cruzado Plan, the Transaction Account, used by the Central Bank of Brazil to provide financial resources to Banco do Brasil for development operations – including agricultural credit. Later, the Constitution of 1988 established that resources for SNCR should be set up by National Congress in the Federal Budget. Hence, for a given year, allocation for the official agriculture credit program had as of then to be included in the budget for that year, voted for in the previous year. That made the program considerably rigid and resulted in the focusing mainly on support programs for small farmers, such as the National Program for Strengthening Familial Agriculture (Pronaf). Hence, to a large extent, National Treasury was no longer a source of important resources for agricultural credit. However, other alternative sources for agricultural credit: requirement resources on bank deposits; the Assistance Fund for the Workers (FAT) transferred via the Brazilian Development Bank (BNDES); the Northeast, North and Central-West Consti-

⁷ The evolution of the last two decades of the agriculture credit policy was quite complex. Our outline of this evolution is mainly based on Rezende (2003) and Rezende and Kreter (2006; 2007; 2008).

tutional Funds; the savings accounts of official banks; the international loans. The result was a quick expansion of long-term borrowing, often with highly subsidized interest rates, especially for the acquisition of machinery and equipment.

In terms of agricultural credit, the comprehensive network of agricultural policies made two important victories: firstly, considerable performance flexibility, which enabled bypassing the strictness imposed by restrictive norms; and secondly, the networks strong ability to obtain results via their pressures, not only to expand credit in the phases where agribusiness is prosperous, but by renegotiating debts in a time of indebtedness crisis within the agricultural sector.

Private agents and networks of agricultural policies

In the third phase, the expansion, modernization and diversification of agriculture and the consolidation of agroindustrial complexes generated the robust increase in the number and scope of associations, representative of the sector's segments. It is a known fact that different production organizations are part of a certain agroindustrial complex, where only a part is associated directly to agricultural production. Companies that provide inputs and services to the agricultural sector, companies that carry out the conversion of their products, and companies that participate in different transport and product commercialization stages are also part of the operation. And nearly every component of a given agroindustrial complex belongs to specific associations, where they participate in the networks of policies that perform by demanding policies of their specific interest, or of interest of the agriculture public sector, with sectorial representation agencies, e.g. the National Agriculture Confederation (CNA), and less formal organizations, e.g. the Rural Representatives in Congress, comprise nowadays the comprehensive network of agricultural policies. In other words, the comprehensive network operates in parallel with networks of thematic or sub-sectorial policies (MUELLER, 2009). This is currently a quite sophis-

ticated framework that is being managed since the early 1990s.

The operation of the comprehensive network of agricultural policies can be illustrated by recent events. Summing up, when Lula stepped into office in 2003, there was no rupture in the development of the third-phase of agriculture. Contrary to the expectations that he would put into place harsh measure for the sector, President Lula appointed Roberto Rodrigues for the Ministry of Agriculture – highly identified with agribusiness. Despite being a staunch defensor of the interests of modern agriculture, and agribusiness, Rodrigues also gave an important contribution to the strengthening of the networks of sub-sectorial policies by creating a series of Sectorial Chambers coordinated by the Ministry of Agriculture; each Chamber sees to the interests of a specific sub-sectorial network (MUELLER, 2009), and also gives support to the comprehensive network of agricultural policies. The latter was strongly mobilized during the end of Rodrigues' term.

In that sense, it is worthy of notice that for most part of his term ended in 2006), the comprehensive network of agricultural policies was not strongly activated. Actually, the boom of agribusiness prosperity of 1999–2004 generated certain complacency. The agriculture public sector did not have to participate more intensely in the purchasing of surplus and the funding of the significant expansion of agricultural production demanded relatively few resources from the National Treasure. Further to the aforementioned mechanisms, funding provided by inputs suppliers increased via the anticipated purchasing by trading, and via instruments such as the Rural Product Bill (CPR) (REZENDE; KRETER, 2007, 2008). The sector had high profits and it seemed to be free of problems with the heavy debt rollover of the agricultural sector; it seemed that the risk of non-payment had disappeared. In 2005, however, there was an abrupt wakeup call; in that year the combined impact of draught and surges of pest and fungi infestations, with declining external commodity prices

where the effects were amplified by the valuing of the real. Commercial agriculture entered a crisis, and the threat of indebtedness once again ran rampant not only in the sector, but also in the components of the agribusiness it had been funding. And under the command of Minister Rodrigues, the comprehensive network of agricultural policies began to exert strong pressure for the approval of relief packages for the new indebtedness crisis. At the end of the Palocci era, there was a strong dispute between the agriculture public sector and the government's economic area; when the Minister of Finance stepped down and with the direct involvement of President Lula the problem was circumvented, and one of the results was the record harvest of 2006–2007. However, as pointed out by Rezende and Kreter (2007), measures adopted merely pushed to the future the problem of huge indebtedness of the agricultural sector. Furthermore, the non-bank funding for commercial agriculture was never re-implemented in a significant manner, generated by the crisis, which increased the pressure posed on the comprehensive network of agricultural policies due to the stronger participation of the public sector to fund the sector.

And are there clashes between the networks of policies?

The above presented discussion could give the impression that in the rural milieu, networks of agricultural policies operate free of opposition, but that is far from being true. There are yet two other policy networks that have been affecting the performance, as well as the potential to expand commercial agriculture, and both are strict networks of environmental policies. Our intention here is not to delve into the operation of those networks, but rather to point out that in the creation of policies that affect the rural sector their actions and demands cannot be ignored.⁸

The creation of the network of agrarian policies started with the implementation of a public agricultural sector, made feasible in 1980 when the military regime ended. Organizations that had the attribution of dealing with agrarian issues at first operated within the scope of the Ministry of Agriculture, but during the Sarney administration they were allocated to form the Department of Agrarian Reform. The agricultural public sector continued to go through changes and to be given new attribution, culminating in the Ministry of Agrarian Development (MDA) of today. Despite the reformist theory soon after the end of the military regime, the sector remained almost dormant until 1995, when land redistribution actions began to gain force, at the same time as the movement of the landless intensified its actions and mobilized the agricultural public sector to reach their policy goals. Presently, the network of agrarian policies is comprised by MDA and Incra (the executive arm of the Ministry) on the one hand, and by organizations for the landless and their allies (such as Pastoral Land) and different non-governmental agricultural organizations on the other. In the administrations of Fernando Henrique Cardoso and Lula, this network of policies became tougher and has taken an aggressive stand in the fight for more land and resources for support and settlement actions. This caused the substantive increase of budget allocations for these policy areas.

The network of environmental policies started to gain ground in the 1980s, and since the very beginning made advancements with provisions to defend the environment in the Constitution of 1988; it inherited the Forest Code but also the passing of an anti-environmental crime law. The environmental public sector was implemented with the creation of the Ministry of the Environment (MMA) and its executive organizations – the Brazilian Institute of Environment and Renewable Natural Resources (Ibama) and the Chico Mendes Institute for Biodiversity Conservation (ICMBio) – and involves

⁸The following outline of both networks is based on Mueller (2009, p. 141-144).

similar state organizations. The sector has been leading the network of environmental policies; a number of non-governmental organizations also participate, some of which significantly influent. Together, they set up a network of strict environmental policies that are becoming notable for obstructing or delaying even projects and enterprises that are priority for the current coalition in power.

The fight between the comprehensive network of agricultural policies and both policy networks is evident. There are also notorious cases of clashes between networks that caused impasse situations: the fight between the comprehensive network and the agrarian network over changing productivity rates for land reform expropriation; and the clash between the comprehensive network and the network of environmental policies over legal reserve issues and the reform of the Forest Code.

Conclusions

This work started under a mistaken outlook, frequently found in assessments about the evolution of Brazilian agriculture and policies for the sector that are exclusively supported by the dimension of rationality. By ignoring the dimension of power, it is implicitly or explicitly believed that economists should focus only on the first dimension, where political science and other fields of science should address the analysis of the aspects of the dimension of power. The problem is that both dimensions cannot be separated, and to forcibly do so could lead to mistaken conclusions. One such example is in the comprehensive study of recent agricultural and agrarian policies by Chaddad et al. (2006). In this study, the authors identified a significant reduction since 1985 of budget resources in actual terms, allocated to both policy areas, but a strong reduction of federal resources for agricultural policies, where there are significant increases of resources earmarked for agrarian policies. Based on rational considerations, the authors propose that both policy areas should be combined under a single public rural sector.

And based on the intuition that the social rate of return of traditional agricultural policies (such as research, extension, animal and plant defense) is considerably greater than action policies (many considered as virtual waste of resources) in the area of agrarian policies, they propose joining the agricultural public sector and the agrarian public sector at the federal level to create a sole area of policies for the rural milieu. Furthermore, they recommend the implementation of an allocation criterion for federal resources for both areas, which should be the social marginal return tax for each policy action. Hence, policies with higher return tax should be granted more resources and policies with reduced marginal return tax, less resources. This way, the redistribution of resources would be supported by an efficiency criterion where society would reap the benefits.

This is a typical example of a recommendation supported exclusively on the dimension of rationality, but with slim chances of being adopted at the present moment in Brazil. Should it be attempted, the network of strict agrarian policies would have a decisive mobilization to prevent its implementation. If the coalition in power – current or in command after the 2010 election – should attempt to adopt this recommendation, it would not only fail but would probably pay a high political price for doing so.

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Brief history of the Ministry of Agriculture, Livestock and Food Supply

José Ubirajara Timm¹
Marlene de Araújo²

Abstract – The purpose of this article is to register some of the most recent historic factors about the Ministry of Agriculture, Livestock and Food Supply (Mapa) based on the experience of the first author. It also intends to provide further material for the collection of institutional records at this time when the Ministry is celebrating its 150th anniversary. The text mentions some of the most important ministers and amusing anecdotes of that agency from 1960 to 1980; it presents and characterizes a typical public governance Brazilian institution, free from any analytical intention and emphasizes its evolution.

Introduction

The history of world agriculture confirms this statement:

[...] it doesn't matter if it's to feed twenty million people or to feed five; there is no other way but to plant the planet in order to multiply its plants and domestic animals, domesticating at the same time the wild flora and fauna (MAZOYER; ROUDART, 2001, p. 11).

This demand for food has reached great proportions over time, which gave rise to the creation of institutions, new techniques and the appearance of great authors and actors, some conservative and others revolutionary, but all with the same goal in mind – to ensure the supply of food. In Brazil it was no different; it may have taken a bit longer, but the Country joined that process.

I am very pleased to participate in this special issue of *Revista de Política Agrícola* (Journal of Agricultural Policy). First, as it foresees an honorable editorial initiative, the opportunity

and encouragement to other media bodies to contribute to the enrichment of the Brazilian public memory, still lacking historical account in the agricultural sector; and second, for the joy of being part of this event celebrating one and a half century of the ministry, run by 171 ministers. I do not participate with the credential of "the last remnant of those 150 years," as affectionately referred by my old friends Eliseu Alves and Tarcizio Góes de Oliveira, but as someone who served the Ministry of Agriculture for over 50 years.

On July 28, 1860, Emperor Dom Pedro II signed Decree no. 1,077 and created the Secretariat of State for Agriculture, Commerce and Public Work Affairs (GUERRA FILHO; PLACER, 1966, p. 42). On March 2nd of the following year, the Viscount of Inhaúma – Admiral Joaquim José Inácio – took on the position of secretary. Since then, this position has been fulfilled 171 times by men acting as the incumbent or as acting secretary, under different names and competences from the current ones. Presently, Wagner

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¹ Lawyer, master's degree in Public Administration, President of the Deliberative Council of the Brazil Environmental Institute (IABS), Brasília, Federal District. E-mail: timm@iabs.org.br

² Journalist, master's degree in S&T Policies and Management, analyst for Embrapa's Secretariat for Management and Strategy, Brasília, Federal District. E-mail: marlene.araujo@embrapa.br

Gonçalves Rossi, lawyer, economist and doctor in education, holds the position of minister.

The average of time in office has been less than a year for each minister. The incumbent minister that held that position for the longest period of time was agronomy engineer Alysson Paulinelli during the Geisel administration, who was acknowledged internationally for his work in expanding the agriculture frontier to the Cerrado, with the creation of the Brazilian Company for Technical Assistance and Rural Extension (Embrater) and with the consolidation of the Brazilian Agricultural Research Corporation (Embrapa) created during the previous administration by minister Luiz Fernando Cirne Lima. Rare were the ministers that held office for longer than 3 years; and after the country was redemocratized during the administration of President José Sarney, ministerial changes became more frequent, where changes occurred often in less than 1 year. The former governor of Brasília, Joaquim Roriz, was minister for only 15 days (March 15–30, 1990). Former minister Reinhold Stephanes had already held office in three previous administrations in important positions at Mapa, as well as for other ministries also in past administrations.

Of the 171 men, some were famous and historic references, without prejudice of the others, and should be noted: Quintino Bocaiúva, journalist and abolitionist leader; Pandiá Calógeras, a mines engineer; Assis Brasil, lawyer and diplomat; Juarez Távora, in the military; and ambassador Oswaldo Aranha.

Juarez Távora was minister during the first administration of Getúlio Vargas after the Revolution of 1930. Before that, he was the actor of two historic events: the Revolution of the Cadets in the Copacabana Fort and the Prestes Column. He later ran for president of Brazil. Oswaldo Aranha, who was also a minister during the Vargas administration, became well-known internationally when he chaired the session of the United Nations Organization (UN) that approved the creation of the State of Israel. Already retired and living in Rio de Janeiro, he would

visit the Ministry of Agriculture during the administration of Mario Meneghetti. However, he started visiting him every day for one month when veterinary doctor Paulo Fróes da Cruz took the interim position, the general director of the then powerful National Department of Animal Production. Curiosity: Paulo Fróes da Cruz, Oswaldo Aranha and other mates enjoyed their *chimarrão*, reminiscing about the good old days when they were just beginning their careers as lawyer and veterinary respectively. In one such occasion, Oswaldo Aranha said one of his famous quotes: "The horse is a noble animal that should be fruit of love," in protest to the intended artificial equine insemination.

The ministry was the scenario of countless examples of honesty and character. For sure that the following examples are not the only ones among the 171 ministers; there were many others that took place both before and after, which could join the club with the same credentials. Brevity is justified by the limitation of space and by the singular fact of having borne witness to what is going to be told.

The minister is not corrupt

Minister Mário Meneghetti (Figure 1) was a doctor, just like Juscelino Kubitschek (JK), and represented the Pascolinist wing of the Brazilian Labor Party (PTB) with the government; another labor minister was precisely the Minister of Labor.

In the relationship between government and society there are facts that show an utter lack of citizenship in government areas and sectors of society, architected by groups that push to be granted undue government advantages. One of these cases can be reported as historical: in 1960, towards the end of the JK administration, one of such groups were planning a nefarious fraud scam called the "paper wheat," where the mills that ground imported wheat would declare a greater amount of wheat than what was yielded by the Brazilian harvest, thus defrauding Banco do Brasil and the National Treasury in billion reais at current costs. In the face of that sce-



Figure 1. Anticipating the date of Mapa's 100th anniversary, minister Mário Meneghetti gathered the directors and their wives to a mass that took place in the ministry's headquarters, in Rio de Janeiro, celebrated by the Bishop of Pelotas, Dom Antonio Zatéra.

nario, minister Meneghetti talked to President JK to abort the scam by prohibiting the bartering of shares between the large imported wheat mills and national mills, especially colonial mills that grinded domestic wheat. At that time, rumor had it that wheat harvest for that year would be 5 million tons, but in fact it was verified that it would not exceed 1 million tons.

The corrupt parties were vanquished; however, the implications of the frustrated scam were huge, including the political ramifications, in that it became impossible for minister Meneghetti to remain in office. After that, he

was appointed by Juscelino as ambassador of Brazil for Central America³.

The minister is not a “shyster”

The “political being” can be defined as an individual that is active in the politics of a social group, formally acknowledged as the active member of a government, or as a person that has influence on how a society is governed given his or her knowledge about the political power of dynamics of a certain group. This precept has been the key factor of the choices

³ The fact had great repercussion with the media, especially newspaper O Globo that published the letter addressed by Minister Meneghetti to Vice-President João Goulart, before he even received it, justifying his resignation. João Goulart was offended by the Minister's involuntary action, as the ‘scoop’ was engendered by a journalist who also worked at the ministry's press room, thus causing the letter written by Meneghetti a public letter, which was never his intention. Journalist Francisco Finamor (in the photo), a close friend of the Vice-President, delivered the letter with the due clarification about the Minister's innocence in that episode. Finamor is still alive and was one of the pioneers in Brasília; now lives in São Paulo.

made by Mapa, and it can be affirmed that in some periods their attitude is right and coherent, aligned to represent the group.

Lawyer and mill-owner from Pernambuco, Romero Cabral da Costa, appointed to the ministry as the representative of the mill sector of the Northeast is an example of such coherence. While he waited for his first meeting with the President, Romero overheard President Jânio Quadros referring to mill-owners as "scoundrels," referring to the directors of the Alcohol and Sugar Institute (IAA), which had just had a heated discussion with him. Romero never had the meeting and stepped down justifying that in deference to the president he could not condone to having a "scoundrel" as a minister, as he was first and foremost a mill-owner⁴. After the interference of the first-lady, Ms. Eloá, Romero reconsidered his decision and remained in office, being supported by Jânio for the duration of the president's short and frustrating administration.

During the seven months when Minister Romero Cabral da Costa remained in office, he worked intensely at Mapa, where there is evidence that he was strongly supported by Jânio. Dozens of work groups and interministerial groups were set up coordinated by Mapa. However, because of Jânio's renunciation, the groups died away, victims of the lack of continuity of actions in ministerial changes. Changes became permanent cultural factors that until these days discourage initiatives to professionalize public administration, and are also a challenge to be faced.

The limit of tolerance

Innovation can arise even in unstable environments and can resist to the most unwilling ones when it proves to be a clear possibility of increasing competitiveness and a fundamental

factor for the society's economic growth, albeit not understood by everyone at a given period in time. And one of the authors of this innovative process was Minister Luiz Fernando Cirne Lima, whose fame of a renowned university professor and technician preceded him when he took office. He was a close friend of president Médici and of Professor Leitão de Abreu, Minister and Chief of Staff to the President, who was also a close friend and peer of the Minister's father, professor Cirne Lima, at the Faculty of Law of the Federal University of Rio Grande do Sul. Luiz Fernando was called by his childhood nickname – "Nando" – by both the President and the Minister. But no sooner was his stand in the conflict of interests between the requests made by the agricultural sector and those of the economic area (frequent conflicts during the history of Mapa) disregarded by the government, he stepped down from office and justified his resignation in a letter addressed to Médice but handed to Minister Leitão de Abreu. He went back to being a professor and a technician in Rio Grande do Sul, leaving his greatest legacy to the ministry – the creation of Embrapa.

The executer of works

The implementation of Brasília, the capital city of Brazil, abounds with nationalistic actions that express the prevailing spirit of that time. And as Brasilia is celebrating its first 50 years this year of 2010, we believe it is relevant to talk about some actions and initiatives that took place within Mapa, some of which precede the inauguration of the federal capital, and other that happened later.

JK's ability in perceiving the result-based management in detriment to beaurocratic inertia is seen in the case of the intended dismissal of Bernardo Sayão. In the early days of the JK administration, he received administrative pro-

⁴ Minister Romero told us what had happened after returning from the President's Office. The witnesses to the reporting were diplomat and poet João Cabral de Melo Neto, a relative and head of the cabinet; poet Ledo Ivo, the Minister's advisory chief; engineer Ricardo Grenhalger Barreto Filho, Administration Secretary General (when Romero left the ministry, on the same Day when Jânio renounced, he was appointed acting Minister), and myself, Ubirajara Timm, coordinator of the "Governor Meetings" during the Jânio Quadros administration.

ceedings proposing the dismissal of agronomy engineer Bernardo Sayão, from Mapa, denouncing his "misappropriation of public funds." When the president studied the case, he realized that the crime was in fact a great work endeavored by Sayão as the manager of the Agriculture Colony of Ceres, in Goiás, which he converted from a small colony into a teeming city with bridges, streets, roads and other improvements. No specific funds were used from the formal budget of the colony to carry out the works, but rather, surplus funds from other activities, as the savings with personnel payroll, as he used the low-cost community workforce to do the building. The punitive proceedings were reviewed and Sayão was pardoned and summoned by JK to head the construction of the Belém-Brasília highway that would integrate the Brazilian territory. As irony would have it, Bernardo Sayão would become the icon of that monumental endeavor when he died at one of the works sites after a shady tree in the Amazon Rainforest fell on him.

Groundbreaking works in Brasília

JK was a "doer" that was intent in making true his motto, which was "advancing 20 years in only 5 years of administration," and for that reason he was not inclined to holding frequent administrative meetings with his ministers. But he acted quite differently in relation to matters related to Brasília, which were discussed directly from the Catetinho of the future capital city⁵. At that time, Mapa had the comprehensive responsibility of managing the fauna, flora and mineral reserves. Having in mind the concern of leaving legacies in Brasília, the ministry carried out three Pioneer endeavors before the new capital city was inaugurated: the National Park that was under the Forest Service until then, and that nowadays is subordinated to the

Brazilian Institute of Environment and Renewable Natural Resources (Ibama), with its famous pools of natural waters and exuberant Cerrado vegetation; the Sucupira Farm to foster animal husbandry, which was prematurely extinct; and the Agrotechnical School that was subordinated to the Superintendency of Veterinary Agriculture Learning (Seave), later transferred to the official network of the Federal District Government⁶.

The fish of Lake Paranoá

Despite being part of nature, human beings cannot survive in their environment without having to handle and change it. Relaying once again on Mazoyer and Roudart (2001),

[...] man is not a born farmer; when he came to be the *Homo sapiens sapiens* was a hunter-gatherer. When he started to farm and to raise cattle, he could not find in nature any species previously domesticated, but he did tame them in large numbers. Nor did he have anatomical instruments fit for farm work, but he did make all types of tools and each time more powerful. Man was able to evolve to the point of fine-tuning combined systems (MAZOYER; ROUDART, 2001, p. 38).

And thus humanity continues to evolve. In Brasília, Lake Paranoá was manmade and had to be populated. Hence, the Superintendency for Fisheries Development (Sudepe), which was an autarchy under the Ministry of Agriculture during the administration of ministers Alysson Paulinelli, Delfim Neto, Angelo Amaury Stábile and Nestor Jost, was responsible for stocking the lake with different species of native and imported fish that multiplied. Currently, those fish supply the markets of Brasília, fished by a cooperative of fishermen licensed by Ibama. Herbivorous fish that help in purifying and cleaning the water of Lake Paranoá are among those species. Recently, a silver carp weighing over 20 kg was caught, this species together with the Big head

⁵ The difficult trip from Rio de Janeiro to Brasília, on a non-pressurized airplane of the Brazilian Air Force (FAB) was compensated by the President's joy in approving requests and by dinner at the Catetinho, where the food was plentiful and music was live, in the company of JK, Israel Pinheiro, Arlindo Silva and other members of the Terracap, and guests of the President.

⁶ Mapa was also groundbreaking in transferring staff to Brasília even before it was officially declared the capital city of Brazil. By Ministerial Decree no. 227, of March 7, 1960, 59 civil servants (directors and managers) that used to work in Rio de Janeiro were transferred to Brasília.

carps and Grass carps species form the Chinese trio that Mapa introduced into Brazil as the result of the first visit to China during the administration of Delfim Neto.

Attributions in excess

Given that politics is the art or science that organizes, guides and manages a nation, such art in internal businesses – home politics – is dynamic and adequate for the purposes it intends to reach. Hence, over the 150 years since its creation, Mapa underwent different attributions, competences and structuring due to the progressive evolution of the Brazilian agricultural sector. Beginning as the Secretary of State for Agriculture, Commerce and Public Work Affairs, from then on different ministries were created to address trade and public works, and new and multiple attributions were incorporated to the new Ministry of Agriculture. The unfoldings were so many that when it is celebrated its centennial anniversary, in the universe of the ministry of agriculture, there were already a myriad of direct and autarchy administration agencies with diverse and different attributions addressing the execution, production, classification, standardization, inspection and monitoring of agricultural production. The ministry had yet to perform the role of teaching, researching and transferring Technologies, oversee the farming, meteorological and climatologic assessment, provide technical and funding assistance to the fishing sector, protect the indigenous people and foster immigration and colonization, rural development and land reform.

Fifty years ago, the land reform was already handled by the Rural Social Service government agency under the Ministry of Agriculture. Since those days until now, eight agencies under different categories and administrations, including those with the status of a ministry, have tried to solve this serious problem; nowadays it is undertaken by the National Institute for Land Reform (Incra), subordinated to the Ministry of Agrarian Development. This is a sorry example of the instability phenomena defined

as “structural ritualism,” which is an attempt to solve a serious problem very much part of present times, via illusory and multiple organizational changes that follow the last one, where only their acronyms are remembered.

Other important national sectors were transferred to the responsibility of the ministry, such as water and energy. Mapa started to be perceived as an eloquent example of organizational hypertrophy with its many services spread through multiple branches, in Rio de Janeiro (the capital of Brazil at that time) and in all the states and hundreds of municipalities. Its sheer size was so notorious that an interesting fact attests what transpired. At the time of its centennial in 1960, the minister's office had four airplanes to perform the work. One of the airplanes was a dual-motor that had hydrogen and water circulation systems adapted to transport the fish that would populate rivers and dams in many states, which was coordinated by a team of technicians created by minister Meneghetti – it was called the Technical Team for Stocking Rivers and Dams with Fish (Etprar).

With the recent creation of the technical career of Federal Agricultural Inspector that encompasses agronomy engineers and veterinarian, among other careers, the almost century-old rivalry between these two important professions has come to an end, as before they would aspire ministerial predominance, where professionals would rule in old and powerful central departments of Mapa – the vegetal production and animal production departments.

Addressing the current situation of Mapa is not part of the scope of this work, hence we will give no further considerations about this aspect, but would like to note an unprecedented and auspicious fact that took place in the first quarter of 2010, when Decree no. 7,107, of March 4, came into effect. This decree signed by President Luís Inácio Lula da Silva approves the regimental structure and the framework of at-will appointments and hired functions of the ministry), where the chapter about the general and transitory provisions (art. 46) sets forth that management level

and at-will positions, the DAS, should be taken by employees of Mapa, selected by the minister from a triple-list of candidates.

The development of Brazil, and consequently the development of agribusiness over the last decades had aligned Mapa to this form of agriculture. Its current mission, deliberated via a comprehensive democratic process among its managers during the administration of minister Roberto Rodrigues, that was repeatedly disseminated and posted at every floor of the headquarters of the ministry in Brasília is the following: to foster agribusiness' sustainable development and competitiveness that benefits Brazilian society. The most important and innovative action in that sense was to expand the Brazilian energy matrix by investing on research on agriculture in order to generate new energy alternatives based on agriculture. Embrapa Agroenergy, founded in 2006, is the institution that makes this goal come true (EMBRAPA AGROENERGIA, 2006).

Conclusion

Summarizing this report, we can affirm that the Ministry of Agriculture, Livestock and Food Supply has built throughout its history a

characteristic of a personal-based institution, based on the minister's figure and the group that represented him. However, it is successful thanks to the fulfilling of national goals and economic development, supported by a body of highly-qualified technical professionals that perceived and still perceive the institution as the instrument that can reach the goals of the State and that guide the administration of a government. This professionalism should be further supported as new result-oriented public management principles are put into practice, and will thus reach leadership positions and professionalism in order to meet the needs of the Brazilian society.

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The end of five decades of taxation of agriculture in Brazil

Ignez Vidigal Lopes¹
Mauro de Rezende Lopes²

Abstract – The underlying scenario of the perspectives of changes made to the agricultural policies of the United States of America and the European Union are the financial crisis that have impacted the two largest producers of agricultural products in the world. The time of tax restrictions is here, which should have repercussions on the allocation of agricultural subsidies. This measure should open new and good growth perspectives for Brazilian agriculture. As well as the perspectives of subsidy changes, there are yet undeniable opportunities in the world market. However, if Brazilian agriculture is to benefit from market opportunities, it is necessary for all policies that distort economic production incentives to be eliminated. At the time when the 150th anniversary of the Ministry of Agriculture, Livestock and Food Supply is being celebrated, it is interesting to measure the effects of the changes made to macroeconomic policies and the sectorial policy over the last five decades. In particular, the events that have taken place over the last decade in terms of reduction of the levels of protection and taxation of agricultural products should be addressed, compared to industrial products. In other words, it is our intention to understand to what extent Brazilian agricultural policies prepare the agricultural sector to compete in world-markets.

Introduction

Since the 1950s, Brazilian agricultural policies have undergone major changes. Initially, they played a secondary role in the policies that were adopted to foster Brazil's industrialization, known as the Policy for Import Substitution (PSI), which was in effect for nearly four decades. PSI had strong impact on agriculture and was characterized by the taxation of the agricultural sector combined with domestic support and agriculture subsidy policies via rural credit and the Minimum Price Guarantee Policy (PGPM).

After those four decades that came to an end in 1990, the agricultural policy has been undergoing major changes. Over the last 15 years,

we have borne witness to the government's gradual and steady withdrawal from any means of intervention in agriculture markets. The macroeconomic plan adopted fiscal disciplines and a strong control over the monetary policy with the purpose of fostering the economy's stability. This package was complemented with an intense process of the opening up for world-market trading.

During the 1980s and 1990s, inflation reached record levels, showing annual growth rate of 200% in the early 1980s; in the early 1990s, inflations exceeded 1,000% annually, which extended until 1994, when the macroeconomy stabilized. The different administrations were not able to impose fiscal disciplines.

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¹ Head of the Center for Agricultural Studies at the Brazilian Institute of Economy of Fundação Getúlio Vargas (FGV/RJ). E-mail: ignez.lopes@fgv.br

² Researcher for the Brazilian Institute of Economy of Fundação Getúlio Vargas (FGV/RJ). E-mail: mrlopes@fgv.br

The period of intense industrialization – from the mid-1950s to 1990 – shows that sectorial and macroeconomy policies managed to transfer income, capital and work from agriculture. These policies practically exhausted that sector. The adopted model also had a quick collapse, and the allocation effects, i.e. supply shocks from the decrease of production, led the government to change the model and to introduce a means of compensating producers via the granting of subsidized rural credit. During the period of the strongest discrimination against agriculture, the sector was not capable of sustaining the same performance of the previous years when Brazil was a major exporter of agricultural products, such as rice, cotton and corn. The taxation of imports and the “cheap food” policy to maintain industrial salaries under control, otherwise too low, were responsible for Brazil losing its ranking in the foreign trade market. Government benefited from the “cheap food” policy because it was a “great entrepreneur,” and with food prices relatively lower it did not have to adjust the salary of civil servants so frequently.

Starting in the late 1970s, instead of removing price distortions due to repeated supply shocks and to enable farmers to compete freely in the world-market, government insisted in maintaining the intervention apparatus in markets and created a means of compensating rural credit subsidy – National Rural Credit System (SNCR) –, in order to introduce technology modernization and changes to agriculture. Instead of adopting the first and best solution, i.e. no tax or subsidy, government adopted a greatly inferior technically policy – the second best – combining taxes and subsidies, even aware of the complications that a policy of such nature could create in terms of price distortions and economic incentives.

During the 1960s and most part of the 1970s, interest rates for SNCR loans were kept below the rate of inflation. Actual interest rates were severely negative throughout the 1970s. Nominal rates were adjusted only by the end of that decade, but actual rates remained negative until the end of the 1980s, when the fazing out

process of interest subsidies started. In the end, this compensation policy benefited only a few products, which was a means of unequal compensation in terms of transferring income from society in general, which paid an inflationary tax (paid by the poor) to a handful of producers, which were precisely those that acquired intensively inputs and were granted subsidized agriculture credit.

In a certain way, it is surprising that throughout the 1980s there was a persistent trend to worsen supply shocks because of the escalating inflation. It would have been better if all export barriers had been removed and to understand that it would be more cost-effective to supply Brazil by exporting than importing. Actually, when Brazil exports the domestic price becomes aligned to the world-market price, deducing the cost of freight and product-landing taxes, and when Brazil imports, the domestic price becomes the international price plus freight and all product-landing taxes. These can reach a very high cost for a country as big as Brazil.

For many years, Brazil exported taxes and imported subsidies. These factors had a strong impact on prices, as will be presented in this study. During the 1980s and 1990s, Brazil was highly dependent on imports to supply the domestic market, thus greatly discouraging domestic production. As well as the SNCR, the PGPM was another instrument used supposedly to compensate producers. Government would finance trading by granting subsidized income rate and would buy agricultural products in the interior at prices above export parity (in the case of corn), and would buy wheat at costs higher than the import parity under the supposed “wheat self-sufficiency” policy.

Macroeconomic reforms and opening trade

The crisis that took place in the mid-1980s, which boosted inflation, was caused due to government spending. In the period 1989–1994, Brazil underwent a large trade policy reform,

where many instruments for import substitution were definitely removed. Trading was opened unilaterally by carrying out a comprehensive tariff reduction and eliminating the whole export control apparatus – especially the Appendix C by the Consultancy and Advisory Office for Foreign Trade (Cacex) that prohibited the importing of certain products on the grounds of “similar domestic product.”

The scope of these reforms was significant. Industrial tariffs were gradually reduced, from 100% to 31% in average, in the period 1994–1997. With the decreased protection to the industrial sector, the implicit taxation of agriculture was gone – based on Lerner’s symmetry theorem – whereby the protection of a sector, such as the industrial, would account for the taxation of another sector, in this case agriculture. Many agricultural products had their tariffs substantially reduced, such as rice (10%), wheat and beans (0%), corn (8%), cotton (0%) and soybean (0%). Later, the tariffs for cotton and beans increased to 6%.

In 1994, Brazil was finally able to attain macroeconomic stability. The Real Plan, which managed to stabilize Brazilian macroeconomic scenario, determined a 1 to 1 parity (R\$/US\$), but at the outset of the Plan the exchange rate was overvalued reaching R\$ 0.86/US\$. Due to this measure, restrictions imposed on government spending ended up reducing agriculture subsidies and government purchasing (PGPM). The implementation of the Southern Common Market (Mercosul) in January 1995 played a role in this scenario. Despite the long list of exceptions presented by the members of the block, the majority of tariffs were annulled and a single and common tariff was created. Another important measure that ensued from the policy and that affected directly the agricultural sector was the elimination of the tax on the export of agricultural products. In 1997, the Tax on Goods and Services (ICMS) applied on exported agricultural products – that the industrial sector did not pay for in its exported products – was waived, thanks to the Kandir Law. The persistence of

the balance of trade deficit led Brazil to finally adopt the fluctuating Exchange rate measure in January 1999.

The reform of the agricultural policies

Starting in 1988 with the fiscal crisis, the PGPM was not able to obtain the required funds to defend minimum prices, which led to the credibility hiatus that persists until today. In part, the government also adopted the deliberate policy of putting less emphasis on policies that interfered with the market by maintaining stocks at a huge cost. As a result of that policy, in 1995 the government practically abolished its purchases, where sometimes purchasing levels remained at a level much lower than those of the past. This policy was consistent with Mercosul; otherwise, if it were to insist on the purchasing policy, Brazilian government would be guaranteeing prices to rice and corn producers in Uruguay and Argentina, for example.

Another important policy was the elimination of mixed capital companies and of the institutes (of coffee, of sugar and of wheat) that regulated the trading, which culminated with the elimination of fiscal funds that financed interventions in most of the products.

Regrettably, Brazil was able to enjoy the desirable regime of a freer trade precisely when the scenario was still ruled by great price distortions because of the modest results from the Uruguay Round. The Round had already frustrated the purposes of the negotiation to open agricultural trade in the world; in practice, what was observed was the “officialization” of subsidies and higher tariffs via the system of “watering tariffs” when non-tariff measures were burdened with tariff.

The positive aspect of this measure was the high investments made on research. If we look at the reduction of the minimum price resources and research investments, it is possible to imagine a policy, although not set forth by the government, of replacing subsidies with

research investments. In that sense Brazil was quite successful, as will be presented below. And this formula served as a model for many countries: cutting down on subsidies and protection to invest in research, that is the right way of obtaining permanent low prices for the consumers.

The impact of the policy reforms in the agricultural sector

Due to the strong fiscal control adopted in 1994, the compensation policy for producers practically ended. This was an added factor that boosted agricultural productivity. Agricultural products that were not traded in the world-market, such as cotton, milk, corn, rice and wheat, suffered directly from the influence of world-market prices, where producers could not rely on domestic compensation. They faced a strong competition of low-cost imports during the transition period.

Investments on agricultural research, the challenge posed by prices and the end of the exchange rate over-valuation helped to elevate Brazil as one of the important exporting countries. In the Central-West, producers also were ahead of the Cerrado technology, not only in terms of tropical soybean, but also in growing rice and cotton, with farming and cattle-, swine- and poultry-raising. Increased chicken exports from Western Santa Catarina and Southeastern Paraná perhaps consolidated the most important agroindustrial complex in the world, where over 10 million birds were slaughtered daily. Thus, Brazil began to export to over 120 countries.

The 2000s – the strategic option to increase exports

Starting in 2000, a new type of agriculture begins to bear its fruit in Brazil. There were three important events that boosted the performance of this new agriculture. New investments made on more researchers started in 1974 and

gained maturity throughout the 1980s, which was highly conducive to increase of technology inventory and boosted production growth. The adoption of new varieties added to the competence of producers in the Central-West created one of the most productive agricultures in the world.

Growth was productivity-based. While the area increased 1.8% annually, from 1990 to 2006, production growth in the same period increased 4.9% annually. With that, production doubled since 1990, while area size increased less than 25%. Agriculture then started to be the flagship of the growth of Brazilian GDP, where the average growth rate was 5.3%, in 2000–2006, while the industrial sector grew only 1.7%.

In 2004, Brazil ranked as the first world producer of alcohol, sugar, coffee and Orange juice, and second in the production of soybean and its byproducts: bran and oil. It became the largest exporter of beef and tobacco, the third in pork and the second in chicken, and the third in fruit and corn. World-market demands and high prices were strong booster of that good performance.

Estimates of distortions ensuing from the policies

Methodology applied to this study represents a step forward compared to previous models used to assess economic incentives for agriculture, given that now protection to agriculture and protection to the industrial sector are confronted. The main focus of this methodology is the quantitative measuring of distortions imposed on the agricultural sector that derived from government policies that created a gap between domestic prices and prices practiced in the world-market under free and unencumbered trade conditions and industrial sector protection. This methodology is similar to the one that calculates the difference between prices given to producers and prices they would be given if

there were no policy distortions, i.e. parity prices reflecting world-market incentives.

Hence, this methodology is a step forward, in that it acknowledges that it is not possible to make a good assessment of distortions ensuing from sectorial policies directly associated to agriculture without taking into account policies that protect the industrial sector. The reason for this is that based on Lerner's symmetry effect, protection granted to a given sector (industrial sector) represents the implicit taxation of another sector (agricultural sector). Hence, methodologies used in the past (when calculations took into account nominal and effective protection coefficients) did not take into account the effect that the protection of the industrial sector had on agriculture, as a form of indirect taxation; this is our justification for adopting a new methodology.

The initial hypothesis is that the discrimination against the agricultural sector is merely one of the episodes in the history of economic policies adopted by Brazil. It was necessary to incorporate the protection of the non-agricultural sector and its effects on agriculture. By integrating both sets of policies, the new methodology obtains a result as accurate as possible with data at hand to have a good assessment of the scope of discrimination against agriculture.

It is difficult to make taxation and subsidy estimates in Brazil, as it requires lengthy data surveying. Brazil has had extremely high inflation rates, and for this reason it was necessary to survey data taking extreme caution. This work was carried out over one year and three months by a team of six researchers working full time. Hence, not only data on prices require a careful treatment, but also data related to rural credit subsidies and expenses made with research and extension – that are part of the methodology – as well as expenses with education on the agricultural sector, inspection services and public expenses. All had to be estimated for the period prior to 1995.

According to the methodology, it is necessary to survey data on import tariffs, which is in itself an arduous task, as tariffs used agriculture were those effectively used, but for the industrial sector varied frequently. To obtain tariffs for the industrial sector it was necessary to study the decrees that determined them until 1986. However, decrees stated only the nominal tariffs that were not actually practiced, as the most important instrument to protect the industrial sector was the system under Cacex's Appendix C, which prohibited the importing of the so-called "domestic similar" products. Consequently, estimates of the protection to the industrial sector are significantly underestimated because only nominal tariffs under the decrees of the Customs Policy Commission (CPA) were taken into account. In fact, the regime of quantitative controls of industrial imports granted much greater protection to the industrial exports than presented by the estimates in this study, but it was not possible to survey data on tariff equivalents actually practiced by the domestic similar product system under Cacex's Appendix C. However, this study will show that surveying nominal tariffs was sufficient to show the high level of protection granted to the industrial sector.

A list of domestic prices and equivalent prices at ports was drawn in order to calculate the level of taxation on agriculture – the so-called parity prices. Comparisons at hand were made wholesale. In some cases, and equivalent wholesale level was calculated using margins as the base price for the producer until the wholesale. Due to the fact that in Brazil the series of wholesale prices were interrupted, it was necessary to use the prices at hand, and where there were none, to use the price of the producer until the wholesale level. Further to the basic commodities, wholesale prices were estimated for processed and semi-processed products.

Product selection

The following products were selected for this study: processed wheat and rice, as im-

ported products; and soybean, sugarcane and coffee, as exported products. In the case of corn and cotton, there was a change of status; initially, they were export products that became import products, and then were once again exported in large quantities. Processed products included: flour, processed rice and raw sugar. The group of meats included cattle for slaughter and chicken and pork as primary products. Beef, chicken and pork directly for consumption were used as processed products. The group of selected products amounts to nearly 75% of the production value of agricultural products in Brazil. Consequently, the scope addressed is sufficiently comprehensive to provide conclusions both about imported and exported products.

The comparisons between CIF prices and FOB prices at ports, parity prices at wholesale and actual wholesale prices were easier to find for some products traded as primary products. That was the case of soybean, corn and wheat, the prices of which was easy to find. For other products, domestic wholesale price was compared to foreign parity price, especially in the case of processed products with wholesale prices provided by the market, as in the case of beef, chicken and pork. It was possible to make adjustments by transforming the live animal – ready for slaughter, in half a carcass, in forequarters and hindquarters; the live chicken

in processed chicken; the slaughtered and live pig in half carcasses, and thus successively. It proved to be less difficult to find the prices for flour, processed rice and sugar. Ultimately, all products were compared for their wholesale prices and parity at the port prices, taken to wholesale.

Taxation of agricultural products for export

In the more remote historical periods, export agricultural products underwent heavy taxation (Figure 1).

Figure 1 shows the aggregated overview of the taxation on export products. However, during the initial estimates that we carried out, the taxation of products is considered individually. According to the findings of this study, the higher levels of taxation were applied on sugar, coffee, soybean and cotton. Brazilian soybean was taxed mainly via contingency policies and export embargoes, which held back the development in the 1970s and 1980s. In the case of coffee, exchange rate seizure determined the exhaustion of resources from Brazilian coffee plantations via the Coffee Economy Defense Fund (Funcafé). Exchange rate seizure of coffee was very high, reaching up to 40% of the value of exported coffee.

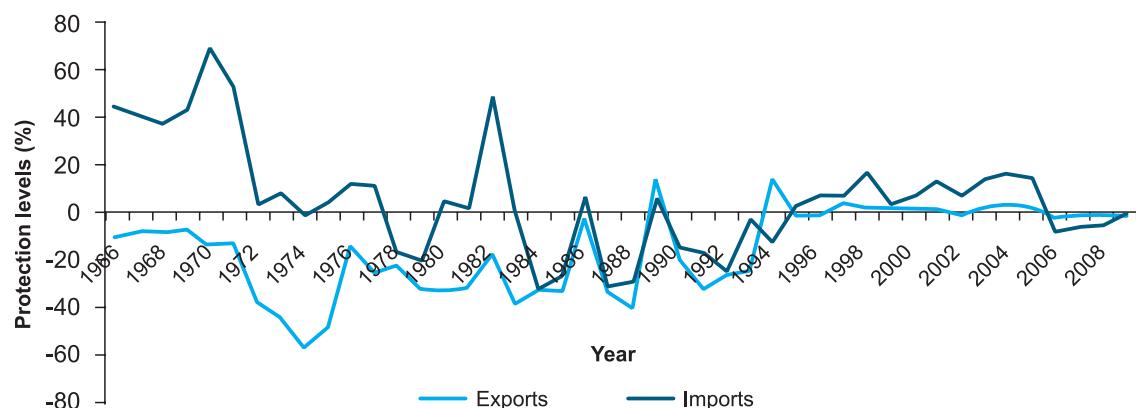


Figure 1. Protection levels (in %) for exported and imported agricultural products in Brazil in the period 1966–2009.

Note: positive values are the levels of protection and negative levels represent taxation.

Source: Lopes et al. (2008).

In sum, one of the most severely taxed products was sugar, which reached over 50% until the early 1990s. Regulatory processes developed by the IAA restricted the exporting of sugar, adopting a system of quotas that made the production of alcohol mandatory. These factors discriminated a sector that could have benefited from better world-market prices if the market had not suffered excessive regulatory intervention. Data show that as of the extinction of the IAA, taxation of the sector fell dramatically and today is near zero.

In the case of coffee, taxation of that sector varied from 47% in 1980 to 25% in the period 1985–1989. More recently, there is practically none. Brazil was the largest coffee producer in the world for many years, depending on its export to subsidize the importing of machinery and equipment for industrialization. Despite the significance of this sector, it was heavily taxed. With the extinction of the Brazilian Coffee Institute (IBC), the sector was able to break free from taxation – implicitly and explicitly, and directly and indirectly. In the Collor administration, that policy was definitely extinct (1990). In 1992, coffee prices and exports were finally opened to the market and a new adjustment process was started in the new administration. Recently, coffee once again was placed under the price intervention regime (PGPM). The question that should be asked is: what motivated those policies if there were producers with competitive costs? As well as the abundance in coffee production, all the de-incentives created by the policy's interventions did not end the plantation of coffee in Brazil, which continued to be a great producer. However, it did leave its indelible mark on the quality of coffee exported by Brazil.

Taxation on soybean oscillated between 10% and 20% in the mid-1970s and the early 1990s. In the mid-1990s, values reflect the control imposed on exports as the government's attempt to stabilize inflation – the same old pretext used in all interventions. As well as qualitative interventions to export soybeans, exports were

taxed with the 13% ICMS until 1996, when the Kandir Law was passed. Exports of soy bran and oil were always exempt of this tax, which benefited grinding industries but not necessarily the producers, as shown by the results. Trade restrictions held back the growth of soybean, which remained relatively stagnated in around 10 million/ha to 11 million/ha, from the 1984 harvest until the 1997 harvest. The rate of taxation on soybean had a significant decline after the Kandir Law, and was gradually eliminated in 1995, which placed Brazil as one of the largest world exporters of beef and chicken.

Protection to imported agricultural products

In the case of wheat, results show that this crop was highly protected until the early 1990s; this result is consistent with the regulation that created the state monopoly of wheat, of importing and domestic trading, via the Commission to Purchase National Wheat (Cetrin) and the Wheat Department (Dtrig). This Draconian regulation was implemented in 1967 and lasted until the late 1980s. The producer's price was established much higher than world-market parity prices (CIF parity), where values were 20%–65% above the parity price of the imported product. These prices boosted domestic production that reached a record of 6.1 million tons in the late 1980s, a figure that almost matched consumption. This was the "self-sufficiency policy" for wheat. Furthermore, government would import wheat and sell it at subsidized prices to the mills, creating a double-subsidy protection system. This was perhaps one of the most radical cases of subsidies for producers, mills and consumers, unprecedented in the history of Brazilian agriculture policy. In 1990, the government carried out a radical deregulation of the sector by terminating Cetrin and all manner of control policies for wheat.

In the case of rice, which is a stable food in the diet of the Brazilian population, government protected that sector for most part of the

period at hand by granting production credit, trade credit and direct purchasing by the government (PGPM); these measures maintained the sector protected. In years when there was crop failure or serious scarcity, the government would import rice in large quantities via the National Supply Company (Conab) that would stock up and sell it as subsidized prices below the import CIF prices. This occurred mostly in the late 1970s and the 1980s.

Protection to the industrial sector

The policy for import substitution gave rise to a very high level of protection to the industrial sector, as shown in Figure 2. This protection was gradually removed. Macroeconomic stabilization policies and the control of fiscal deficits in 1994 definitively forced the end of government interventions via tariff protection. In 1998, protection to the industrial sector was reduced, which also reduced taxation on agriculture. Thus, Brazilian agriculture – now free to compete without any interference, subsidies

and taxes – responded strongly in terms of performance indicators, placing Brazil as one of the largest world exporters. Now, it is time for the industrial sector to match the threats posed by the market.

While the prices of agricultural products were being distorted due to policies (protectionist) for other sectors (industrial sector), the discrimination against the exporting of agricultural products prevailed. Figures show the discrimination against agriculture. The negative protection of agriculture represents taxation, and positive protection figures represent the protection of the industrial sector. After the reforms, notably as of 1995, discrimination ended and the exporting of agricultural products peaked.

The reduction of industrial tariffs had a significant impact, in that it provided a measure of relief in terms of implicit taxation on agriculture. It is clearly seen that the convergence of the taxation on agriculture at a rate near zero was only possible thank to the weakened protection policy to the industrial sector that simultaneously reached an almost-zero rate. One

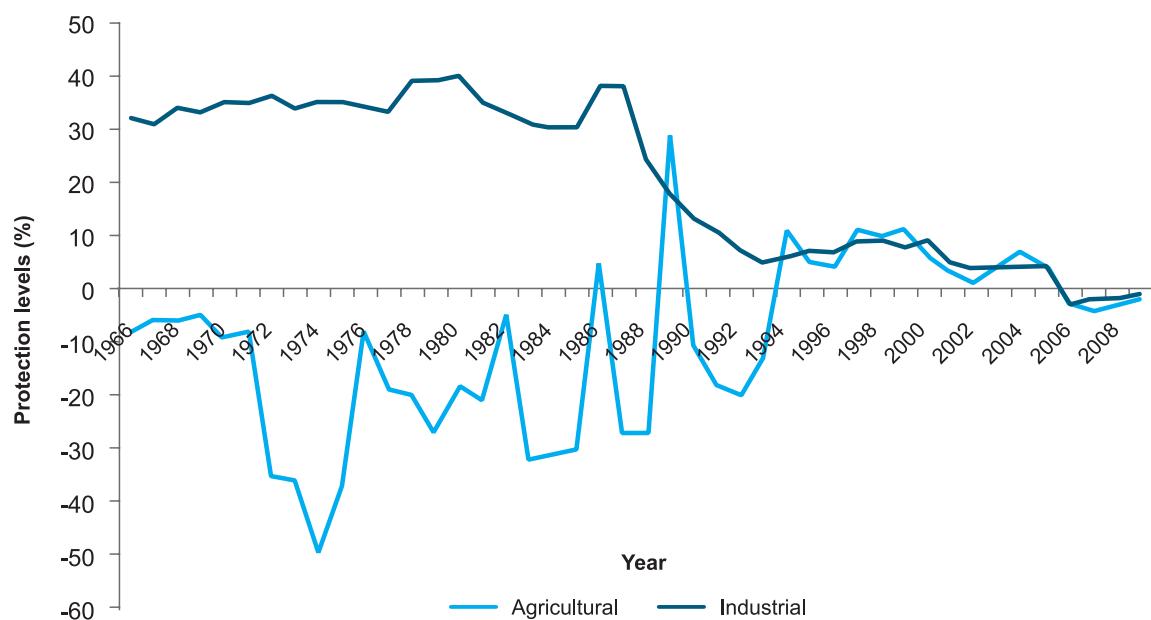


Figure 2. Protection levels (in %) for industrial and agricultural products in Brazil in the period 1966–2009.

Note: positive values are the levels of protection and negative levels represent taxation.

Source: Lopes et al. (2008).

movement is perfectly consistent with the other. In other words, the decrease of taxation to zero was due to the decline in the protectionist policy for the industrial sector.

In effect, by reducing the protection to the industrial sector, essential production factors, such as capital and labor, were reallocated to agricultural activities in which Brazil had significant comparative advantages, whereby the country was able to reach a much higher level of efficiency. Agriculture then had total productivity of factors almost two and a half higher than the industrial sector, which placed Brazil on the list of leading nations that export agricultural products. The overall gain of wellness for the Brazilian population was considerable. In sum, results yielded by policies implemented from the Real Plan that followed the implementation of the free trade structure started in 1989 followed the same direction and created a favorable environment for the unprecedented growth of the agricultural sector in the history of Brazil.

There is a general idea that agriculture is granted subsidies from the interest rate of debt negotiations. This is a misconception, as the protection policies for the industrial sector, as mentioned in this study, tax agriculture. However, taxation is indirect, i.e. implicit and concealed, and as such is not perceived. The past, as shown in the results, reveal this dramatically. And the present is quite different from that scenario of the past.

The findings of this research leave no room for doubt that asymmetric policies that gave preferential treatment to the industrial sector impaired agriculture, which only started to thrive when the arsenal of policies was removed. Hence, the previous policies halted the development of agriculture during three decades.

Furthermore, the findings of this study show that with the Real Plan, taxation on agriculture quickly declined. Price distortions were eliminated after a long period of discrimination against agriculture. During this period, consumers benefited from that policy, but the price paid

was a dear one in terms of increase of productive capacity of the primary sector, its ability to export and Brazil's ability to generate income, jobs and wellness, both in rural and urban areas. Capital and work were transferred to the urban-industrial sector. Urban poverty was merely rural poverty that changed its address. The urban area benefited from the low food prices but ended up paying a steep price for not growing at rates compatible with the abundance of Brazilian agriculture.

Conclusions

By removing discrimination, the exporting sectors of agriculture became one of the most competitive in the world, where domestic and world-market prices were aligned without creating major shocks or inflation, and helping reduce prices over the last years. Gradually, subsidized credit was withdrawn. However, what remained were high levels of compromised resources for financing agriculture, ensuing from the refinancing of the agriculture debt. But in general, rural credit gradually moved towards the direction of commercial interest rates with the reduction of loans granted at concessional rates, although some import products still maintain some means of protection, as in the case of wheat and especially rice. The spectacular results obtained from Brazilian agroindustrial exports can be also credited to these drastic reforms introduced to the monetary and fiscal policies and the non-interference of the State. The strategic options adopted by Brazil have placed it among the greatest agro-exporting nations of the world.

The gradual elimination of mixed capital control agencies was crucial, as well as the weakening of the role played by the PGPM as a fiscal discipline that ultimately benefited agriculture. It is for sure that the agricultural sector greatly benefited from the fiscal discipline, the economic stability and the monetary policy; however, the sector definitely helped all the three factors, where the Real Plan was the pillar.

The reduction of agriculture tariffs, and first and foremost of industrial tariffs, represents a major boost for agriculture.

This set of measures was the driver for the agricultural sector to respond vigorously in terms of investment expansion, building a production base that reached the highest levels of productivity. Together with the reforms, tariff reduction for the industrial sector boosted Brazilian agriculture, as it helped directly to reduce the prices of industrial products used in the production process (such as fertilizers). All these factors together – freedom to export, non-interference from the government, low tariffs and withdrawal of administrative controls – were conducive to the strong alignment agriculture, whereby it was elevated to compete under the same terms as its world-market peers. Brazilian agriculture could then compete with the largest agro-exporting nations in the world.

Mercosul helped this happen, in that is put pressure on Brazil to induce the agricultural sector to adopt spearhead technologies. If agriculture had not responded positively to the challenge, it would have declined significantly. The elements that backed agriculture's spectacular results are: soil, climate, technology and research, to mention but a few. But there was also a well-structured agricultural business sector, first-class business leaders that migrated to the Mid-West, taking with them human capital, and, above all, courage to face the challenges – roads, infrastructure, and storage – until them considered insurmountable obstacles. They came from the states of Rio Grande do Sul, Santa Catarina, São Paulo, Minas Gerais and Paraná to conquer the Central-West. Today, once again they are the driving force of the development of Piauí and Maranhão, as states that export soybean.

This process became more intense with the economic reforms. When the price of agricultural products were aligned to world-market prices Brazilian agriculture underwent a sustainable growth process starting in 2000, alongside inflation that was under control, public spending relatively disciplined by a fiscal policy and

the end of the urban trend – the policy of low-cost food for the consumer and low-cost inputs market reserve for the industrial sector. Finally, agriculture was able to supply the domestic market and compete with the world-market at the same time.

Future perspectives

As presented in this study, economic incentives for Brazilian agriculture differ greatly from those of the past. But the future still has many unanswered questions. Prices fell in 2005 and 2006, causing Brazilian agriculture to a situation of quick indebtedness, especially the producers of soybean, corn and cotton in the Central-West. In 2007, prices once again started to rise, but a great agriculture debt still remains, which hangs over agriculture as a "sword of Damocles." The solution to this problem is being able to see a better future for the sector. Agricultural production depends basically on the world-market high prices, as a consequence of severe infrastructure limitations in Brazil.

The stagnation of the so-called lost decades caused a great part of domestic production to be sent to the world market. Nowadays, Brazil is perhaps taking its first steps towards a sustainable growth, which is fostering a great improvement in the dietary standard of the Brazilian population. Today, food prices put a pressure on inflation. Brazil must once again develop its agriculture, build production capacity and continue to export and supply the domestic market. To be able to do that, it is mandatory for the country to face infrastructure problems: roads, highways, railways, ports, etc. Logistics is at the top of the agenda of high-priority investments in Brazil in order for agriculture to keep on growing.

In Brazil, the pressure posed on the price of food is no surprise; this trend had allowed for better distribution of income. Better than what has been seen so far, the sector's future will also depend on the ability of the Brazilian government to make the exchange rate converge to

its long-term level of equilibrium. This variable plays a crucial role among agriculture's incentives and de-incentives.

Rural poverty remains a great challenge for sectorial and global policies. Spearhead technology agriculture is capital-intensive and requires huge investments before it reaches minimally competitive technical and economic levels. In this process, subsistence producers are becoming more and more distant from a competitiveness scenario. For both the subsistence farmer and the stand-alone producer agriculture is not a solution. Minimum forms of association, rural partnerships and business associations are indispensable in order to solve the rural poverty problem. Nowadays, there is a growth of land consortiums and condominium schemes, associations to exploit a consortium business, where a group of producers form associations. This has been the road take. Government has been in-

vesting enormous resources trying to recover the subsistence producer and for sure it is time to assess this expenditure.

Finally, it is important to remember that the future of Brazilian agriculture depends to a great extend on eliminating trade distortions and free and unencumbered trade barriers in the world market, which the Doha Round of multi-lateral negotiations so far has failed to give sign of minimally satisfactory results. Brazil could greatly benefit from a favorable result, but were far from reaching an adequate solution.

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The dynamism of Brazilian agriculture^{1,2}

Elisio Contini³
José Garcia Gasques⁴
Eliseu Alves⁵
Eliana Teles Bastos⁶

Abstract – The Brazilian industrialization process was fundamental to modernize agriculture, creating in cities the demand for food and other inputs. Under this process, three agriculture policy instruments were put in place: subsidized credit, development of science and technology, and rural extension. In the period addressed, from 1975 to 2010, the five most important grains (rice, corn, beans, soybean and wheat) increased production by a yearly rate of 3.66%, and increased productivity by 2.95%. Soybean crops have been the flagship. From 1979 to 2009, beef production increased by 5.42% per year, pork 4.66%, and chicken 8.45%. This dynamic is related to the evolution of the domestic market and exports. Over the last years, sugarcane production increased approximately 9.0% annually. As a global model of agricultural efficiency, Brazilian total factor productivity for the period 1970–2006 increased by 2.27% per year. Agriculture and agribusiness exports generated a trade balance equivalent US\$ 403 billion from 1997 to 2009, helping to balance Brazil's foreign trade. Projections show that Brazilian agriculture and agribusiness have a great potential for growth, where the most dynamic products are soybean, chicken, sugar, ethanol, cotton, soybean oil and cellulose.

Keywords: agriculture, agribusiness, production efficiency.

Introduction

The evolution of Brazilian agriculture over the last 35 years – from 1975 to 2010 – shows the efficacy and efficiency of its players. The revolution that took place in production and productivity is due to entrepreneurs, many of which small farmers, the availability of low-price arable land in the Cerrados, despite their low chemical fertility, the development of technologies for tropical edaphoclimatic conditions and for the implementation of agricultural policy instruments, such as credit and minimum price guarantee.

In the mid-1970s, when looking at "potential production supply," the agricultural land of the South, such as in Paraná and Mato Grosso do

Sul, had already been taken. What was left was low-fertility farmland in the South and large extensions of savannah in the Central-West, used at that time for extensive livestock production.

On the demand side for that period, industrialization was already gaining momentum in Brazil, leading, in its wake, to accelerated urbanization, as urban salaries were higher than agricultural salaries. The new challenge was to supply the growing population with affordable food and to increase and to diversify agricultural exports and agribusiness processed products, ensuring international reserves to import capital goods, mainly for the emerging industry.

The agricultural sector responded favorably to these new challenges. Supported by sci-

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³ Researcher for Embrapa Strategic Studies and Training (Cecat). E-mail: contini@embrapa.br

⁴ Research and Planning technician for the Institute of Applied Economic Research (Ipea) and Coordinator for Strategic Planning of the Ministry of Agriculture, Livestock and Food Supply (Mapa). E-mail: jose.gasques@agricultura.gov.br

⁵ Advisor to Embrapa's President and researcher for Embrapa. E-mail: eliseu.alves@embrapa.br

⁶ Assistant to the Strategic Management Advisory Office of Mapa. E-mail: eliana.bastos@agricultura.gov.br

ence, it was gradually modernized and showed significant land, labor, and capital productivity increase. In addition, soil correction systems and new plant varieties were developed for the Cerrado. As a result, wide unproductive regions were incorporated to production. Thus, the supply for the growing domestic market was guaranteed and exports increased and became diversified.

This paper updates a chapter of a book published by Embrapa in 2008, the *Agricultura Brasileira – Quatro décadas de inovações tecnológicas, institucionais e políticas* [Brazilian Agriculture – Four decades of technological, institutional and political innovations], presenting data up to 2004/2005. It uses data up to 2009 (in some cases up to 2010), reinforces some trends previously identified and assesses current sector performance.

This paper focuses on the evolution of agricultural production and productivity, both partial (land, labor and capital) and total factor productivity (TFP), as well as the use of raw inputs and analyses of exports. It initially identifies the industrialization process as the driving force of the Brazilian agriculture modernization. The period analyzed is from 1975 to 2010. The evolution of the sector is described and fundamental factors that boosted its rapid development are assessed. In the conclusion, production and export projections are presented for main crops and beef, pork and chicken.

This study supports the thesis that the abundance of Brazilian agriculture and agribusiness was not created by chance, but rather a result of political will and intelligent actions that take advantage of foreign and domestic market opportunities.

Industrialization as the driving force of modernization

Over the last decades, Brazilian agriculture was modernized, following the transforma-

tion of the global economy and of Brazilian society led by strong industrialization. After World War II, the Brazilian industrialization project was consolidated based on the following ideas:

- According to the thesis of the Economic Commission for Latin America and the Caribbean (Eclac), led by Raul Prebisch (1964), the terms of trade were going against countries that exported raw materials. Hence, economic policy should favor the development of the domestic market and the diversification of export goods. The solution was to industrialize.
- The two-sector model, such as the one professed by William Arthur Lewis (1969)⁷, was based on the hypothesis of zero marginal productivity of labor in the agricultural sector. As a solution, surplus rural workers should be transferred to industrial and service sectors.
- The war showed that military power was largely dependent on the industrial sector, which had greater ability to diversify and to generate jobs. Those jobs were essential with the increase in birth rates.

In the early 1950s, Brazilian government adopted the draft industrialization economic policy. Until the early 1970s, the industrial sector was granted a series of advantages that discriminated agriculture. The policy was based on the following procedures: supporting an overvalued exchange rate; maintaining multiple exchange rates to favor capital goods imports and to prevent other goods imports; and granting loans with subsidized interest rates to the capital goods industry.

Economic policy also promoted consumer goods imports and investments in energy and transport infrastructure. Finally, low food prices were maintained to avoid pressure over urban

⁷ Lewis and Theodore Schultz won the Nobel Prize in 1979 for "pioneering research on economic development [...] where particular considerations were made on the problems of developing countries." Lewis is best known for his concept of "double economy." According to Lewis, the economy of a poor country can be deemed as having two sectors: a small "capitalist" sector and a very large sector than can be called "traditional." This two-sector model became the main theory of the developing process for less developed countries during the 1960s and 1970s. According to this model, the traditional sector is characterized by excessive work because marginal work productivity equals zero (W. ARTHUR..., 2007).

salaries. Government priorities were urban infrastructure, investments in housing and health, and salary safeguarding.

The signs became quite clear in the rural areas: discrimination against agriculture and the promotion of the industrial sector strengthened the population's attraction to cities, and rural migration increased rapidly. Table 1 shows that the urbanization gained momentum from the 1950s and accelerated in the 1970s. This urbanization process is quickly losing momentum because the cycle has been completed in almost every region of Brazil, except for the North and Northeast (ALVES et al., 1999). Table 1 provides projections for 2010 and shows the slowing down of rural migration.

Recent work by Alves and Rocha (2010) shows that rural-urban migrations is still taking place in Brazil, but at a much lower rate than observed some years ago (Table 2). In the period 1991–2000, the rate of migrants from rural to urban areas was 24.7%, and from 2000 to 2007 it fell to 12.5% of the rural population.

Industrialization accomplished its role of creating a diversified and urbanized economy and of increasing the purchasing power of Brazilians. Combined to the population growth in the period 1950–1990, the demand for food increased at rates of up to 6% per year, fostering a very favorable environment for both growth and modernization in agriculture⁸. The opportunity cost of labor increased for farmers in an environment that was conducive to massive rural migration, which made producers intensify and mechanize agriculture.

Hence, industrialization and urbanization set forth the paradigm of agriculture transformation, where the main base was technology and science. Politically, it shifted power from the fields to the cities, transforming Brazil into a sophisticated urban society. Dias and Amaral (2000) provide an excellent assessment of the most important transformation undergone by agriculture until the late 1990s.

Table 1. Urbanization (in %) of the Brazilian population from the 1940s on.

Census year	Rate of urban population
1940	31.2
1950	36.2
1960	44.7
1970	55.9
1980	67.6
1991	75.6
2000	81.2
2010 (forecast)	86.8

Source: original data from IBGE (2010b).

Instruments of modernization

Three policies established the process of agricultural modernization: subsidized credit, especially to buy modern inputs and to finance capital; rural extension; and agricultural research, coordinated by the Brazilian Agricultural Research Corporation (Embrapa).

Given that modern technology largely focuses on modern inputs, rural credit is an agricultural policy instrument that enables its adoption. By the late 1980s, the private sector played a minor role as a lender for rural producers. The Brazilian federal government was the strongest investor, especially through Banco do Brasil and Banco do Nordeste. During the 1970–1985 period, interest rates were more intensely subsidized in Brazil (COELHO, 2001).

Figure 1 shows the amount of money granted as loans to producers and cooperatives in the period 1969–2009, values are in 2009 reais. When compared to other periods, 1975–1982 is outstanding in terms of credit volume, reaching the highest value in 1979, with R\$ 132.6 billion. It was during that phase that rural credit drove Brazilian agriculture modernization. Following a strong rural credit reduction in the 1990s, when values were less

⁸ Starting in 1980, population growth rates started to decline, a trend which became stronger in 1990.

Table 2. Rural population in Brazil and regions in 1991, 2000 and 2007, and number of migrants for the periods 1991–2000 and 2000–2007.

Regions & Brazil	Rural population 1991 (1,000 inhab.)	No. of migrants 1991–2000 (1,000 inhab.)	(%) Base 1991	Rural population 2000 (1,000 inhab.)	No. of migrants 2000–2007 (1,000 inhab.)	(%) Base 2000	Rural population 2007 (1,000 inhab.)
North	4,107.00	771	18.8	3,914.10	673.00	17.2	3,630
Northeast	16,721.30	4,223	25.3	14,759.70	1,659.00	11.2	14,770
Central-West	1,764.50	461	26.1	1,540.60	-25.00	-2.0	1,789
Southeast	7,514.40	1,696	22.6	6,851.60	1,108.20	16.2	6,440
South	5,726.30	1,699	29.7	4,780.90	574.00	12.0	4,739
Brazil	35,834.50	8,850	24.7	31,847.00	3,986.00	12.5	31,368

Source: Alves and Rocha (2010).

than R\$ 40 billion, in 1996, the government started to subsidize harvests again, reaching R\$ 75 billion⁹ in 2009.

Government rural credit and public and private technical assistance together jointly physical and human capital. Until the 1990s, this partnership was compulsory, and producers paid a technical assistance tax through a bank. Nowadays, it is a voluntary partnership and private technical assistance prevails in commercial agriculture.

In the period 1950–1985, the modernization of agriculture as a public policy did not intend to address the majority of producers. The low level of education of most farmers, poor resources available for rural credit and land-related issues, such as land property rights, did not enable the spread of technological development. For that reason, selectivity was chosen, and consequently, rural credit, given that it has an embedded self-selection mechanism resulting in automatic elimination of farmers that do not fulfill the requirements. Hence, the fact that modernization was not inclusive is not in any way surprising. The poorest region of Brazil, the Northeast, was one of the most affected due to its lower rate of education, higher number of irregular land situations and a great number of risk averse farmers.

In the period 1950–1970, the emphasis was on rural extension, research was neglected based on the assumption that there was already a large stock of technologies available. In the early 1970s, it was brought to light that it was a false assumption. Yet it became clear at that time that it was not convenient for Brazil to expand production merely by increasing the area for crops, although over half of the Brazilian territory was still untouched. The best option would be to expand production by increasing land productivity, and to reduce the pressure to conquer the agriculture frontier. For that reason, heavy investments were made on agricultural research with the creation of Embrapa in 1973, and post-graduate courses were created, without reducing rural extension investments made by the federal government. In the mid-1980s, the federal government started to reduce the budget to disseminate technology. In 1991, the responsibility of rural extension was transferred to the Brazilian states, ending a partnership that had started in 1956.

With respect to agricultural research, the creation of Embrapa and of the National Agricultural Research System is a landmark in the modernization process of Brazilian agriculture. In other words: a state-run company under pri-

⁹ The figure not include credit resources for familiar agriculture (Pronaf).

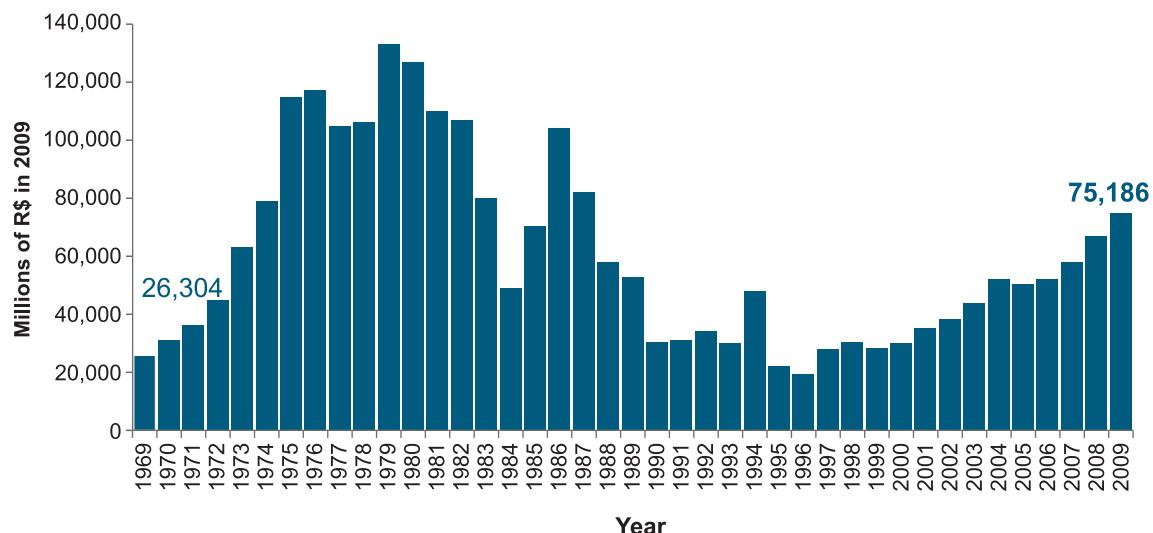


Figure 1. Evolution of rural credit in Brazil – funding to farmers and to cooperatives granted by the National Rural Credit System, in the period 1996–2009.

Note: data deflated by IGP-DI.

Source: Banco Central do Brasil (2010). Data deflated by IGP-DI.

vate Law was created with greater management flexibility and agility, and a research-based model was designed to focus on human resources training and to create centers of excellence in Brazil and abroad, with adequate research infrastructure (such as laboratories) in order to maximize human intelligence time (Figure 2).

Research centers were created according to three criteria: economic significance of products; in little known environments, and in strategic areas. The federal government supported agricultural research mainly through Embrapa, through agricultural research in the Brazilian states and agricultural science universities. Thus the basis was established for a science revolution in Brazilian agriculture.

Applied science unveiled the mystery of acid soils, which were previously considered useless in the Cerrado. New plant varieties turned scientific discoveries into production at growing rates. Inefficient and extensive livestock production was replaced by pioneer and efficient tropical agriculture. Millions of hectares were incorporated into Brazilian agriculture. Brazil became a world model of how to convert unproductive

natural resources into productive resources. Currently, over a third of the Brazilian grain production comes from the Cerrado region. Livestock production also improved with animal genetics, where new grazing lands were developed and new nutrition techniques were put in place.

Brazil still has large extensions of arable land that can be incorporated into the production process. There are estimates showing that over 100 million hectares of cerrado area can be incorporated into agriculture to grow annual and permanent crops, maintaining the Amazon Rainforest, which occupies 350 million hectares, intact (IBGE, 2010b; CONAB, 2010). Furthermore, 160 million hectares of pastures (IBGE, 2010b) can be potentially intensified, thus leaving land free to be used for other applications. The environmental issue is safeguarded by the legislation that establishes a percentage of native area to be preserved, and at least 55 million hectares have to be protected, this area is larger than the actual area used for annual crops.

The intensification of agriculture has also required the use of a considerable amount of modern inputs, such as fertilizers (Figure 3).

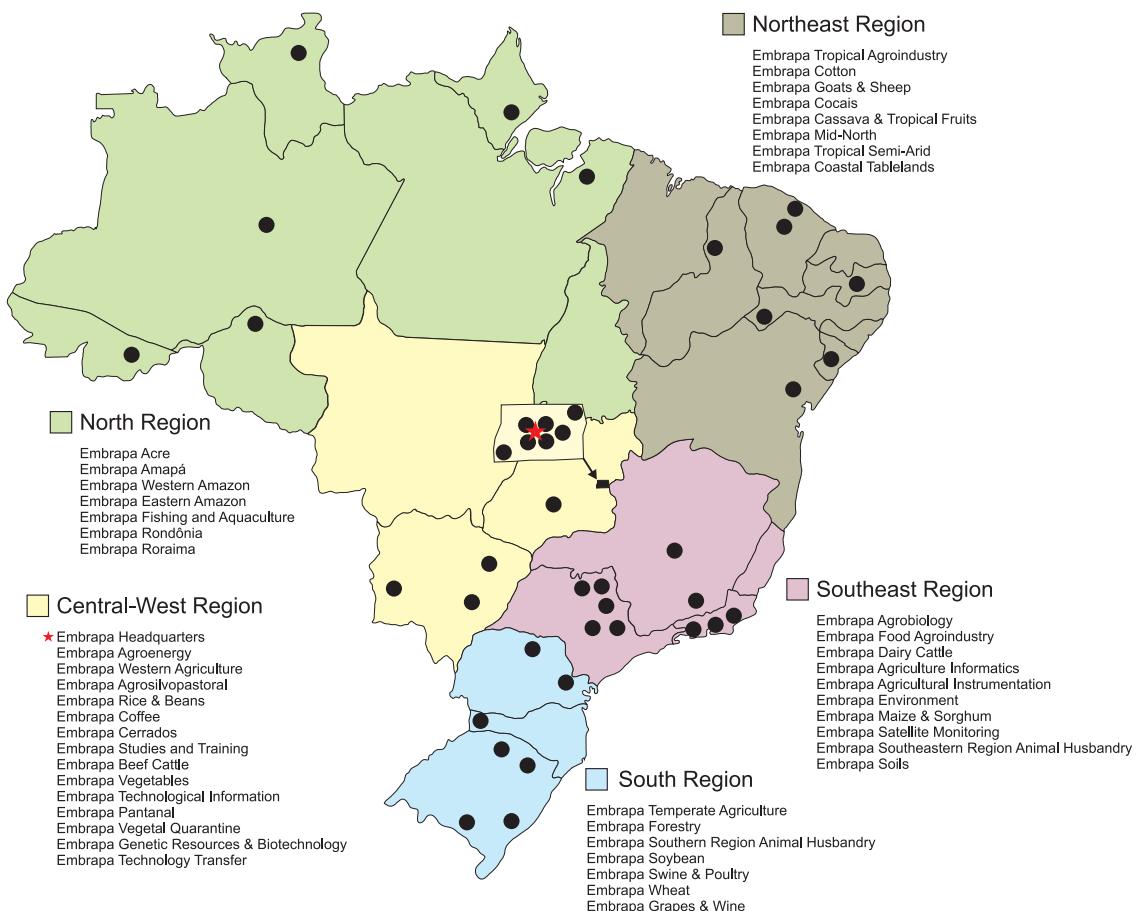


Figure 2. Embrapa's research framework – headquarters and research centers.

Thus, the consumption of fertilizers is one of the indicators of the modernization process that took place in agriculture over the last years. In long-established areas, fertilizers were used to recover soil fertility, and in new areas, such as the Cerrado, to correct soils.

Figure 3 shows the evolution of fertilizer consumption in Brazilian agriculture, according to the Brazilian Institute of Geography and Statistics (IBGE) and the National Association for the Dissemination of Fertilizers (Anda). Considering fertilizer consumption in terms of total nutrients, the average annual rate of consumption of nitrogen, phosphate and potassium fertilizers increased by 4.74%, in the period 1975–2008. This rate was higher than the increase of agricultural production over that period, i.e. 3.68% per year (GASQUES et al., 2008).

The intensification of Brazilian agriculture also occurred with the increased use of agricultural machinery. The factors that helped this expansion were: i) higher demand of agricultural products by the domestic and international markets; ii) strong rural-urban migration; and iii) the creation of the Program to Modernize the Fleet of Farming Tractors and Associated Implements and Harvesters (Moderfrota), in January 2000. The recovery of rural credit resources that started in 1996 was a major help to boost agriculture.

There are some interesting facts in the machinery and equipment market. There was an increase in domestic sales for tractors of all sizes. Small-sized tractors (up to 49 HP) sales increased over the last years but the trend is downward. Average-sized tractors (50–99 HP) sales which were traditionally utilized in Brazilian agricul-

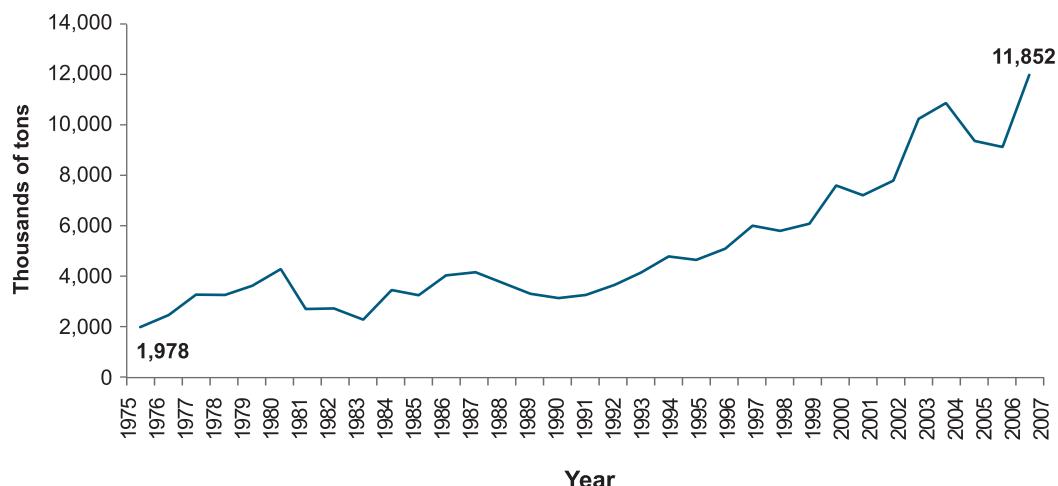


Figure 3. Evolution of the apparent consumption of fertilizers in Brazil, in tons, in the period 1975–2007

Source: IBGE (ANUÁRIO ESTATÍSTICO DO BRASIL, 1975–2008) and Anda (2010).

ture, and 100–199 HP tractors, considered large tractors, are the most sold ones.

The farming machinery market also had an increase in large-sized equipment sales, such as 200+ HP tractors, with over 600 units sold in 2008/2009 (Figure 4). From 1996 to 2009, the domestic sales of tractors were the following:

- Up to 49 HP wheel tractors: sales increased from 655 to 1,322 units annually.
- 50–99 HP wheel tractors: sales increased from 7,008 to 32,230 units.
- 100–199 HP wheel tractors: sales increased from 2,627 to 10,032 units.

When machinery and equipment are considered together, there was also a significant expansion. In 1996, 8,993 units were sold; in 2004, 5,598; and in 2009, 3,683.

Evolution of crop production, area and productivity

Production growth depends on the expansion of planted area and/or increase in productivity. Since the 1970s, yields started to explain production growth rates. It is certain that agri-

cultural prices influence and are influenced by the increase of production. But it is common to agree that modern technology contributes to increasing production, which is reflected in decreasing prices. Thus, there is a precedence relationship.

Depending on the nature of technology, lower prices can interrupt technology dissemination. However, if technology is neutral or if the linear production function is homogeneous, the self-control mechanism will not exist. Hence, technology comes first in order to evolve into price changes. In other words, it is admitted that worldwide technology is the main cause of decreasing prices.

Over the last years, the trend shows a systematic growth of Brazilian crops (Figure 5). The most outstanding fact is that it has been occurring mainly due to productivity gains. That has been the driving force of production increase.

The historical behavior of grain production, area and productivity is shown in Figure 5, which displays the evolution of those crops from 1975 to 2010. While area increased by 45.6% in that period, production increased 268%. Another outstanding aspect is productivity, as the trend shows a significant productivity increase during the period analyzed. There were some

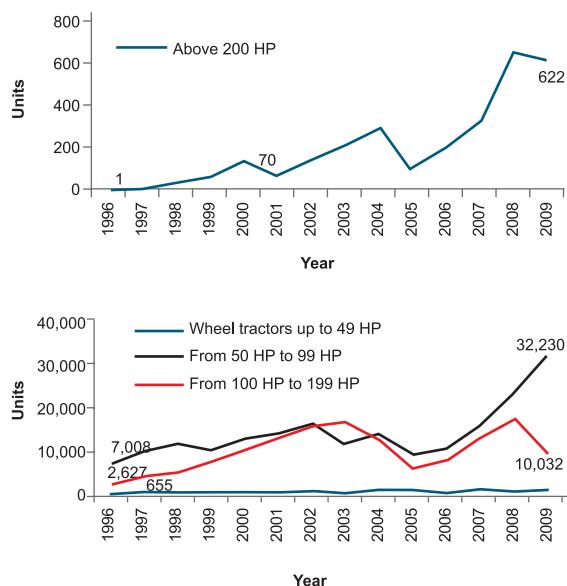


Figure 4. Sales of agricultural equipment in the Brazilian domestic market in the period 1996–2009, as per HP.

Source: Anfavea (2010).

decreasing points, such as in 2004 and 2006, mainly due to draughts. The productivity indicator for the average of grains went from a value of 1,258 kg/ha in 1977, to 3,000 kg/ha, in 2010. This resulted in a 3.2% annual growth average.

Another factor worth mentioning about Brazilian grain production is the second-harvest corn, also called *safrinha* corn, which is planted after the official harvest. Generally, the small harvest is planted in February, although some regions may anticipate or delay the beginning period. The second harvest corn became economically important in Brazil, especially in the Central-West region – mainly in Mato Grosso. Until 2000, it was practically irrelevant but in the 2009/2010 season it was planted in over 5 million hectares, and according to forecasts production will reach approximately 20 million tons and productivity will reach over 4,000 kg/ha.

The increase in agricultural production provided a higher availability of crop products. This is an important factor, as it reflects the positive response of agricultural production in face of a bigger population and it is also a good indica-

tor within the food security context. This observation is ratified by the increased production of staple foods over the last years. Even during the worldwide food crisis of 2008, Brazil's supply was steady, prices increased but returned to historical levels in a short time.

Growth rates of area, production and productivity

Growth rates of production and productivity were estimated for the following periods: 1975–2010, 1980–1989, 1990–1999 and 2000–2010. Production growth in the period 2000–2010 is largely due to yield growth rather than planted area that increased significantly for soybean (3.5%), and little for corn (0.38%). Planted areas with rice, beans and wheat decreased in the period 1975–2010.

All crops in Table 3 increased production at higher rates than the population (1.6%). In the case of soybean, the increase was due to exports and animal protein production. Corn was largely influenced by the advancement of livestock production of beef, chicken and pork.

The effect of the stabilization program that kept exchange rate overestimated, especially for 1990–1999, caused a substantial reduction of harvested area, except for soybean (+2.66% per year). The annual average reduction per grain area was -0.57%, and probably occurred in low-quality soil worked by less efficient farmers.

Certainly, technological innovations helped to increase yields. However, recently (2000–2010), harvested area increased for all crops except for rice (-2.07), where soybean had an outstanding increase (5.0%). Looking at the period 1975–2010, the annual expansion of harvested area was only 0.70%. For grains, soybeans were outstanding (3.58%), and rice, wheat and beans presented an area reduction of -2.38%, -1.63%, and -0.64%, respectively.

There was a 3.32% per year increase for all crops during the period 1975–2010. In all periods, soybean was the major product, with 5.55% annual variations for the whole period

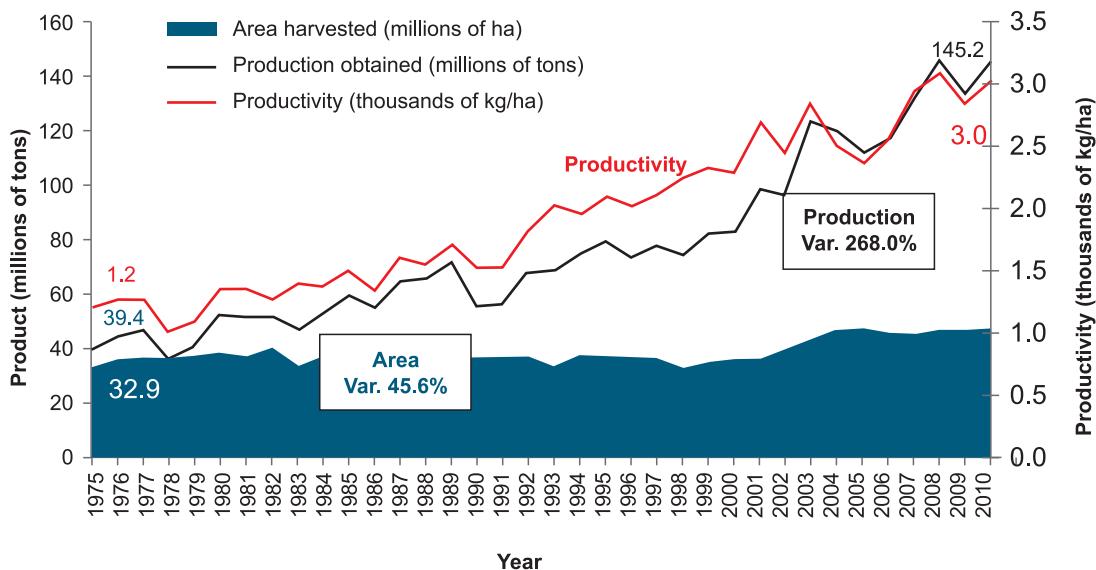


Figure 5. Evolution of harvested area in millions of hectares of grain production and productivity, in millions of tons, in 1975–2010.

Source: created by the authors for this study, based on data from the National Food Supply Company (CONAB, 2010).

and 6.06% more recently. Corn came in second place with 4.38% annual growth (2000–2010). In the 1990s, wheat production decreased (-2.09% per year); but that crop had increased 14.76% between 1980 and 1989, showing significant variations between both periods due to a change in the agricultural policy for that product. In January 1999 there was a change in the exchange rate regime and a floating exchange rate was put in place. As a result, imported agricultural products were no longer capable of replacing domestic production.

The evolution of land productivity largely shows the incorporation of technology, particularly biological technologies, to the production process. Crop productivity in the period 1975–2010 increased by 2.59% per year, with a positive evolution for all crops, where rice (3.51%), wheat (2.92%) and corn (3.04%) were outstanding. Soybean productivity grew 1.90% annually. More recently (2000–2010), soybean productivity increased only 0.96% per year, which can be explained by strong draughts during the 2004–2005 and 2005–2006 harvests, especially in the South of Brazil.

As a conclusion, the data show the substantial increase of production efficiency for all crops during all periods at hand, when growth rates were higher than those for the Brazilian population. Rural producers have added technology to the production process, which resulted in a surplus that was sent to the international market, which was fundamental to prevent domestic prices from decreasing and to balance Brazilian trade.

In the past, an overvalued exchange rate caused an increase in imports and this disturbed domestic production. However, with exchange rate fluctuation, this effect ceased and production continued to grow due to growing yield.

Evolution of livestock production and productivity

Evolution of production

A revolution has taken place in Brazilian meat production (Figures 6 and 7). Considering the three main types of livestock (beef, pork and chicken), production jumped from 2,659,000 tons

Table 3. Annual growth rates.

Harvested area					
Period	Rice	Corn	Beans	Soybean	Wheat
1975–2010	-2.38	0.38	-0.64	3.58	-1.63
1980–1989	-0.97	1.72	1.35	3.35	5.08
1990–1999	-3.25	-0.95	-3.04	2.66	-6.15
2000–2010	-2.07	1.53	0.13	5.05	3.09
Quantity produced					
Period	Rice	Corn	Beans	Soybean	Wheat
1975–2010	1.05	3.43	1.52	5.55	1.35
1980–1989	2.98	2.98	1.13	4.16	14.76
1990–1999	0.82	3.54	0.28	6.80	-2.09
2000–2010	1.31	4.38	2.63	6.06	5.96
Productivity					
Period	Rice	Corn	Beans	Soybean	Wheat
1975–2010	3.51	3.04	2.18	1.90	2.92
1980–1989	3.99	1.24	-0.22	0.79	9.21
1990–1999	4.20	4.53	3.43	4.04	4.32
2000–2010	3.45	2.80	2.50	0.96	1.79

Source: IBGE (2010a).

in 1975 to 19,503,000 tons in 2009, i.e. a seven-fold increase. The production of chicken went from 373,000 tons to 9,940,000 tons (27 times); pork from 496,000 tons to 2,924,000 tons (6 times); and beef from 1,791,000 tons to 6,640,000 tons (4 times). There was production growth during the entire period for all types of meat.

The above-mentioned data shows the competitive advantage of Brazilian livestock production given the availability of low cost inputs, such as pasture for cattle and corn and soybean meal as feeding for pork and chicken. Besides the resources advantages, the improvement of macroeconomic conditions, such as controlled inflation (1994) and the exchange

rate correction (1999) stimulated the sustained growth of meat production. The growth of Brazilian domestic income and higher international demand created a market for increasing production. For Brazilian exports, livestock production adds value to primary products, such as soybean and corn.

In terms of animal production, it is important to point out the evolution of milk. Even though in the past milk imports were subsidized in the origin, domestic policy for milk was disrupted and the exchange rate was overvaluated, production has been growing more steadily than the population. In 1975, milk production was 7.9 billion liters, reaching 11.2 billion liters in 1980,

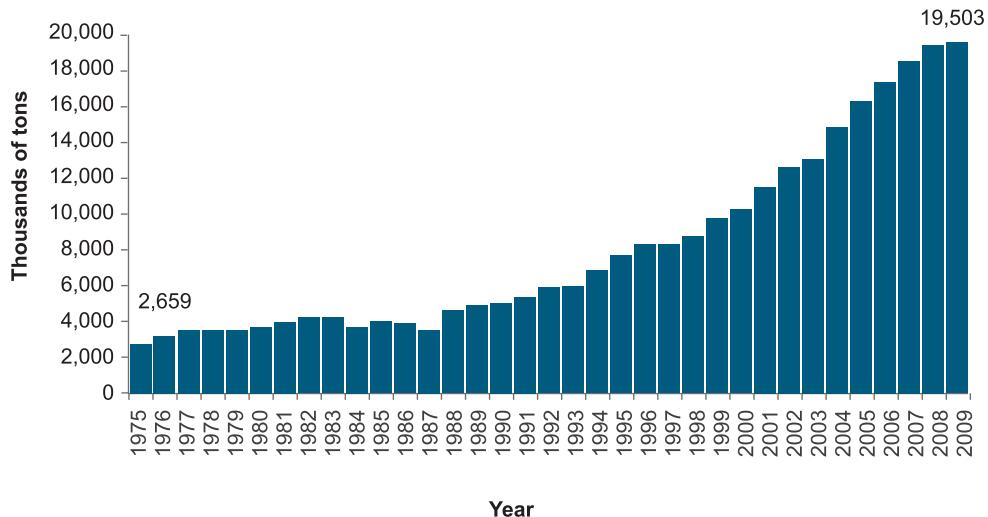


Figure 6. Evolution of total production, in tons, of cattle, swine and poultry carcasses in Brazil in 1975–2009.

Source: IBGE (2010a).

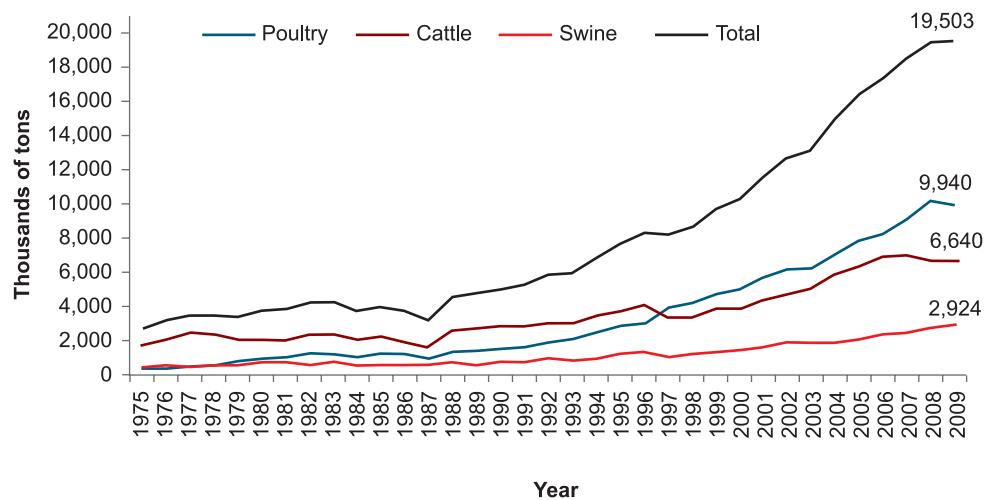


Figure 7. Evolution of production, in tons, of cattle, swine and poultry carcasses in Brazil in 1975–2009.

Source: IBGE (2010a).

and 14.5 billion liters in 1990; 19.8 billion liters in 2000; and 30.3 billion liters in 2009.

The annual milk production growth rate in the period 1980–2009, was 3.47%, a much higher growth rate than the population growth rate, which shows that milk has high income elasticity. The positive milk production reaction is strengthening as prices are no longer regulated and because the exchange rate is fluctuating. Milk production in Brazil is becoming more

modern as production efficiency improves. Hence, new opportunities are being created with recent exports of powdered milk.

The growth rate of meat production

Table 4 shows the geometric growth rate of beef, pork and chicken production. For the period 1979–2009, the production of all types of meat increased: 8.45% per year for chicken;

5.42% for beef and 4.66% for pork. Chicken and beef had a vigorous increase over the three decades analyzed. Pork increase was less than 2% per year in two decades (1980–1989 and 2000–2006), but it still exceeds the growth rate of the Brazilian population.

Evolution of fruit production and productivity

The evolution of fruit production over the last decades is shown in Table 5. Given that products are presented in different units it is not possible to compare them. All products showed a significant increase in production in the period. The most significant increases occurred with lemon, apple and papaya production. Especially in the case of apple and papaya, there was a significant technological improvement over time, which allowed Brazil to become an important producer of both fruits.

Table 4. Annual growth rates of meat production (in %).

Meat	1979–2009	1980–1989	1990–1999	2000–2009
Beef	5.42	8.51	4.50	3.11
Pork	4.66	0.18	5.63	1.97
Chicken	8.45	4.72	9.58	7.25

Source: Conab gross data (2010).

Table 5. Production growth rate of the area and yield of selected fruit and produce, in the period 1975–2008 (in %).

Product	Quantity produced	Area	Productivity
Banana	1.68	1.47	0.21
Orange	3.77	2.17	1.57
Lemon	5.13	2.88	2.19
Apple	11.51	5.34	5.86
Papaya	9.53	5.89	3.44
Mango	2.14	2.54	-0.40
Grapes	2.61	0.70	1.89

Source: IBGE (2010c).

Table 5 shows annual production and productivity growth rates for some of the most important Brazilian fruits for the period 1975–2008. Apple production showed an impressive 11.50% per year increase in that period, which was mainly caused by its introduction as a commercial crop. Other high growth products were lemon (5.13%), papaya (9.50%) and orange (3.80%).

Also in terms of productivity, the best performance studied was shown by apples, papayas, lemons and grapes that increased 5.86%, 3.44%, 2.19%, and 1.89% per year, respectively.

The recent boom of agroenergy

The expansion of agroenergy in Brazil over the last years is one of the most relevant points in the dynamics of domestic agribusiness. Total ethanol production (anhydrous and hydrated) went from 14.43 million cubic meters

in the 1996/1997 harvest to 27.58 million cubic meters in 2008/2009 (Figure 8). Sugar production increased 130.5% during that period, from 13.63 million tons to 31.3 million tons. Sugarcane production also increased between 1997 and 2009, from 289.52 million tons to 563.64 million tons.

The growing demand for hydrated ethanol, mainly in the domestic market, and higher sugar prices in international markets are the main factors explaining production expansion. However, government policies also played a role. The government has two instruments to intervene in the ethanol fuel market. The first one is the mandate to blend anhydrous ethanol and gasoline. This blend can vary from 20% to 25% depending on production availability. The second instrument has a more structural nature and is a lower IPI tax (IPI is an industrialized goods tax) applied in cars fueled with ethanol, with the exception of cars with up to 1000 cc.

Another important institutional incentive for the sector is the National Program to Foster Alternative Electric Energy Sources (Proinfa). The main goal of this program is to give incentives to diversify the energy matrix by increasing

the use of alternative sources of energy. Through Proinfa there are incentives for cogeneration of energy from biomass residues in small power plants and aeolic energy plants.

The sugar and ethanol industry is experiencing optimistic times due to some favorable facts. Not only is the domestic economy starting to recover, which is reflected in higher sugar and fuel consumption, but also foreign markets became more attractive due to production crises in other sugar supply countries, such as India, in 2009/2010.

In 2002, when consumers started to renew their interest in cars fuelled by ethanol, the launch of flex-fuel cars and higher oil prices abroad caused the production of hydrated ethanol to become a great business, especially in cities near producing regions. After only 2 years of existence, flex-fuel technology already accounted for 50% of new cars sales, in 2005, and 90%, in 2009.

It is estimated that over the next years at least 1 million vehicles will be put into market annually, which require 1.5 billion liters of hydrated ethanol for annual consumption. These vehicles are expected to consume an average

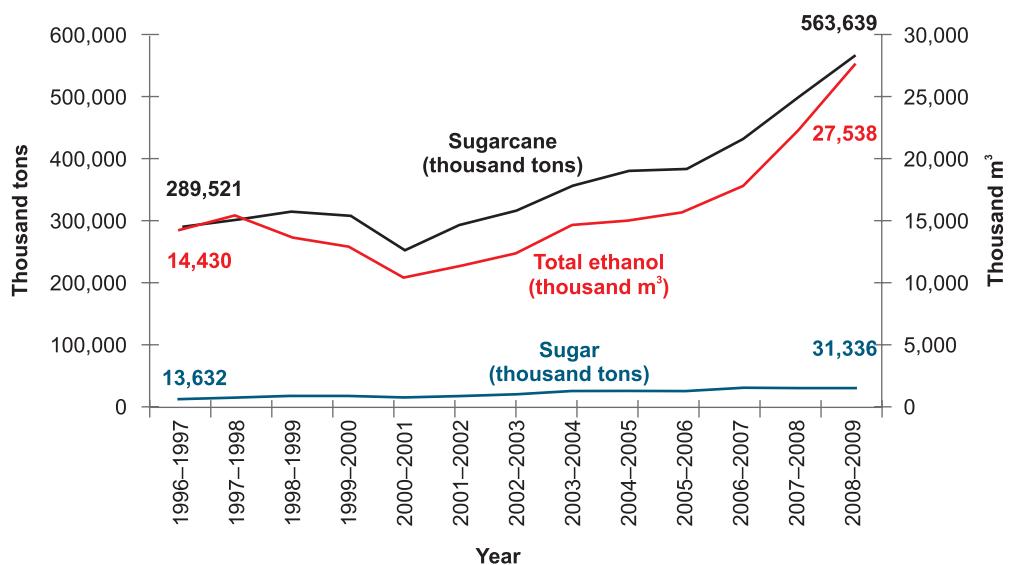


Figure 8. Evolution of sugarcane, sugar and alcohol production in Brazil, in the period 1996–2009.

Source: Brasil (2009a).

of 2,000 liters/year; however, 500,000 liters/year should be discounted, as it will not be consumed by the old fleet that is deteriorating.

Total Factor Productivity¹⁰

When IBGE disclosed the 2006 Agricultural Census data, it was possible to update and to improve the Total factor Productivity (TFP) previous work for the 1970 to 1995 period by Gasques and Conceição (2001). With new information it is possible to study the behavior of Brazilian agricultural productivity in greater detail and for a longer period of time. The database provided by the Agricultural Census gives a better coverage for products that are included in the productivity calculation, as well as presents a comprehensive information about agricultural inputs. Furthermore, it helps to obtain state productivity estimates instead of only aggregated indexes for Brazil. The main purpose of this section is to estimate Brazilian total factor productivity indexes, for the period 1970–2006, using as reference the 1970, 1975, 1980, 1985, 1995/1996 and 2006 Censuses.

Brazilian total factor productivity shows a growing trajectory during these 36 years of agricultural development analysis. There was no decrease in any of the periods considered, which leads to the conclusion that agriculture has been steadily growing. TFP starts in 1970 from a 100 index and in 2006 this index was equivalent to 224, representing a 124% increase in the period. Looking at the product index there was a change from 100, in 1970, to 343, in 2006. The input index evolved from 100 to 153 between the two points of comparison (Table 6). However, while agricultural production, which is a combination of vegetal and livestock production as well as rural agroindustry products, increased 243%, input use increased by only 53%, for the period 1970–2006. This result shows that Brazilian agricultural growth was mainly based on productivity.

Figure 9 shows these results more clearly. It presents product, input and productivity indexes. The different lines show that, until 1955, Brazilian agricultural production was mainly driven by higher input use. This can be observed because the red line, which corresponds to inputs, is above the green line, which corresponds to total factor productivity. In fact this was a period with strong land growth because land was occupied in new regions, such as the Central-West. It also reflects the large subsidies granted to rural credit and a pattern of growth characterized by the introduction of technology in the agricultural sector.

Based on growth rate results it can be seen that product index increased on average 3.48% annually during the period 1970–2006 (Table 7). Looking at 1995–2006, product growth was equivalent to 3.14% per year. The states of Mato Grosso and Rondônia showed the highest growth rates for both periods. In Rondônia, the index increased 10.24% per year from 1970 to 2006, and 7.15% from 1995 to 2006. In Mato Grosso, it increased over 6% per year in the entire period, and 8.68% from 1995 to 2006.

TFP average annual growth rates in the 1970–2006 historical period was 2.27%, and 2.13% in the period 1995–2006.

Table 6. Product index, input index and TFP in Brazil.

Year	Product index	Input index	TFP (100)
1970	100	100	100
1975	139	122	114
1980	173	142	122
1985	211	149	142
1995	244	137	178
2006	343	153	224

Source: data obtained from Gasques et al. (2010).

¹⁰ This section is based on the article by Gasques et al. (2010).

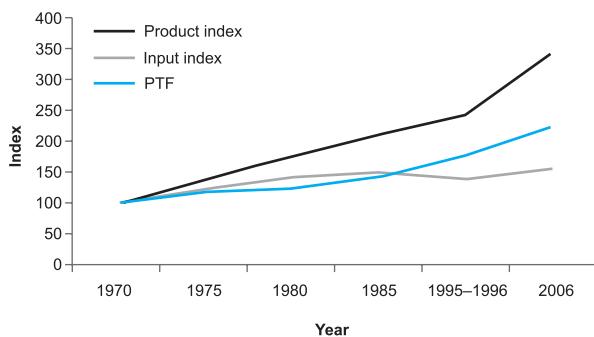


Figure 9. Product index, input index and TFP in Brazil.

Source: Gasques et al. (2010).

When investigating the main causes for product growth, one sees that between 1970 and 2006, total factor productivity explained 65% of agricultural product growth, and higher quantity of input use explained 35%. During the 1995–2006 period, the increase in total factor productivity explained 68% of agricultural product growth, while higher input quantity use explained 32%. Hence, productivity has been the main driver for the growth of Brazilian agriculture.

Table 7 shows land and labor productivity growth rates, which allow the calculation of the land area growth rate that each producer can farm. This rate is equivalent to the difference between labor and land productivity. During the period 2006/1970, the annual rate for the area each producer farmed was equivalent to 0.21% per year, and for the period 2006/1995 it was equivalent to 0.24% per year. These apparently low growth rates for labor productivity, when considering the area each producer farms, is greatly due to the fact that Brazilian agriculture is not sufficiently mechanized, with the exception of grains production in the Central-West, and parts of the Southeast and South regions of Brazil.

According to some studies, the agricultural labor force is now better trained (DEL GROSSI; SILVA, 2006; BALSADI, 2006; DE NEGRI, 2006), which is in fact one of the causes of higher productivity. The improved management of rural

Table 7. Growth rate of product index, input index, TFP, land productivity and work productivity in Brazil.

Specification	2006–1970	2006–1995
Product index	3.48	3.14
Input index	1.19	0.99
TFP	2.27	2.13
Land productivity	3.32	3.16
Work productivity	3.53	3.40

Source: Gasques et al. (2010).

units is also part of the better training of workers, as shown in a piece of research carried out by the Confederation of Agriculture and Livestock Production of Brazil (CNA).

Another critical factor for the higher agriculture productivity was the improvement in machinery and equipment over the last years. A study carried out by Embrapa (ALBUQUERQUE; SILVA, 2008) shows the increased operational capacity of farm machinery and equipment and their effect on sugarcane yields. The trend for the last years shows greater use of medium and large size tractors, which also explained the increase in labor productivity (ANFAVEA, 2010).

The increase in land productivity was due to greater research investments, especially by Embrapa, and also due to the use of new areas, which occurred during this 30-year period. Over the last years technological innovations for rice, corn, coffee, sugarcane and livestock were enormous (ALBUQUERQUE; SILVA, 2008). In addition to the innovations introduced by research to improve quality and productivity, other innovations production processes, such as no-till farming, bacteria inoculation, integrated pest management and the development of varieties and species with enough flexibility to adapt to different environmental conditions.

Greater investments in research have a direct effect on productivity. The 1% increase of investment in research made by Embrapa has

increased the index of total factor productivity by 0.2% (GASQUES et al., 2008).

Looking at TFP growth in the 1995–2006 period, Figure 10 shows that there was diversified growth in the Brazilian states. Two states located in the Northern region (Pará and Tocantins) presented productivity growth below the Brazilian TFP growth. In the Northeast, only Paraíba and Rio Grande do Norte presented a TFP growth below the Brazilian average. In the Southeast, only in Espírito Santo and Minas Gerais productivity growth was above the Brazilian TFP growth. In the South, Rio Grande do Sul and Paraná productivity growth was below the Brazilian average, and in the Central-West only Mato Grosso presented a TFP growth above the Brazilian average (Figure 10).

Agricultural and agribusiness exports

Brazilian exports experienced major changes over the last 11 years (Table 8). The most visible ones occurred in the ranking of products and scope of countries of destination. In terms of ranking of products, the main change is related to the new position meat occupies. In 1997, beef, pork and chicken accounted for 6.8% of the value of Brazilian agribusiness exports. In 2009, the figure for beef export (US\$

11.78 billion) corresponded to 18.4% of the amount exported by Brazilian agribusiness (BRA-SIL, 2009a). Another change was the opening of new markets and the reduction of exports to countries that were traditionally partners of Brazil. For over 10 years, trading with China, Russia, the Middle-East, and also African countries has increased; there was a relative reduction of exports to Japan, Germany and the United States.

In the period 2000–2009, production and exports of beef, pork and chicken had an impressive growth. Those sectors showed a better performance than crops, except for soybean and corn, which are directly affected by livestock production. Despite exports growth, domestic per capita consumption also grew at higher annual rates, of which chicken presented the highest rate.

Both export growth and per capita consumption show how relevant livestock production was for the welfare of the Brazilian population. Table 8 shows exports growth rates for different periods; notice that there was a small reduction of beef and chicken in the 1980s. However, in other periods, exports for both types of meat were impressive. Pork exports increased rapidly in all periods.

Another performance measure of the domestic agribusiness is the degree of openness expressed in the relationship between the value of agribusiness exports and agribusiness GDP.



Figure 10. TFP growth rates in the states, in the period 1995/1996–2006.

Source: Gasques et al. (2010).

Table 8. Growth rate of Brazilian meat exports, in the period 1979–2009 (in %).

Meat	1979–2009	1980–1989	1990–1999	2000–2009
Beef	7.92	-0.91	13.59	14.16
Pork	24.28	28.62	23.91	12.37
Chicken	11.38	0.51	10.71	15.82

Source: gross data by Conab, created by AGE/Mapa (BRASIL, 2010a).

As shown in Table 9, in 1994, the degree of agribusiness openness was 2.67%, whereby the sector exported a smaller percentage of its GDP. In that same year, the degree of openness of the economy in general was 8.02%. In 2008, the degree of agribusiness openness was 17.2%, while the degree of economic openness was 12.1%. That change in agribusiness was fundamental to expand the sector and to modernize it.

Table 9. Degree of openness of the economy and of agribusiness.

Year	Total exports (R\$ million)	Total GDP (R\$ million)	Agribusiness exports(R\$ million)	Degree of openness Total (%)	Degree of agribusiness openness (%)	Agribusiness GDP(R\$ million)
1989	0.04	0.43	0.0	9.65	-	-
1990	0.86	12	0.4	7.46	-	-
1991	5.02	60	2	8.33	-	-
1992	70	641	26	10.87	-	-
1993	1,424	14,097	589	10.10	-	-
1994	29,412	349,205	12,904	8.42	2.67	99,240
1995	42,911	705,641	19,258	6.08	4.06	171,040
1996	48,129	843,966	21,314	5.70	4.58	186,933
1997	57,278	939,147	25,255	6.10	5.49	199,941
1998	59,545	979,276	25,087	6.08	5.41	208,917
1999	88,886	1,065,000	37,942	8.35	7.90	236,849
2000	101,071	1,179,482	37,785	8.57	8.00	269,732
2001	137,011	1,302,136	56,140	10.52	11.69	302,880
2002	180,981	1,477,822	74,477	12.25	13.90	374,061
2003	223,635	1,699,948	93,774	13.16	16.96	489,355
2004	281,432	1,941,498	113,853	14.50	19.96	549,039
2005	285,417	2,147,239	105,226	13.29	19.75	554,694
2006	298,597	2,369,484	107,235	12.60	18.92	566,816
2007	310,049	2,661,344	112,750	11.65	17.55	642,628
2008	362,923	3,004,881	131,657	12.08	17.22	764,494
2009	304,502	3,143,015	128,893	9.69	-	-

Note: total degree of openness is the relationship between exports and GDP; and degree of agribusiness openness is the relationship between agribusiness exports and agribusiness GDP.

Source: data from Mapa (BRASIL, 2010b), Cepea (2010) and Ipeadata (IPEA, 2010). Created by AGE/Mapa.

Figure 11 presents the importance of agribusiness exports to balance Brazil's trade accounts. Every year, the sector presented a significant surplus, while other sectors presented a deficit. From 1997 to 2009, the accumulated trade balance for the agribusiness was equivalent to US\$ 405 billion. As of 2003, performance improved, and in the last 2 years (2008 and 2009), the annual value was higher than US\$ 55 billion.

Agribusiness projections for Brazil in the period 2009/2010–2019/2020

Brazilian agribusiness has a large potential for growth. The domestic market for all products analyzed is expressive, and the international market has shown a strong growth. Overpopulated countries will find difficult to meet food demand due to the depletion of their farming areas. Difficulties to replenish worldwide stocks, increased consumption, especially of grains (like corn, soybean and wheat), and the ongoing urbanization process in the world create favorable conditions for countries like Brazil that have a huge production potential and technology available. Brazil's availability of natural resources and the style of domestic agriculture growth based on continuous and increasing productivity gains are also competitiveness factors.

The most dynamic products of Brazilian agribusiness in the future should be chicken, sugar, ethanol, cotton, soybean oil and cellulose. These products point to a high growth potential for production and exports in the next few years.

It is estimated that the production of the five most important grains (soybean, corn, wheat, rice and beans) should exceed 129.8 million tons in 2008/2009 and 177.5 million tons in 2019/2020. This indicates an increase of 47.7 million tons to the current production in Brazil, and a 36.7% increase in relative values. Meat production (beef, pork and chicken) should increase by 8.4 million tons. This represents a 37.8% increase in beef production in 2009. Three other products with estimated high increase are: sugar with over 15.2 million tons; ethanol with 35.2 billion liters; and milk with 7.4 billion liters (Table 10).

Agricultural production growth in Brazil should be productivity-based. Recent studies estimated that total factor productivity will continue to increase. Results attest for higher increase in agricultural production than for area increase. Projections indicate that from 2010 to 2020, average crop production growth rate should increase by 2.67% annually, while area should increase by 0.45%.

Although Brazilian exports will increase over the next years, the domestic market will absorb most of the production. Projections for soy-

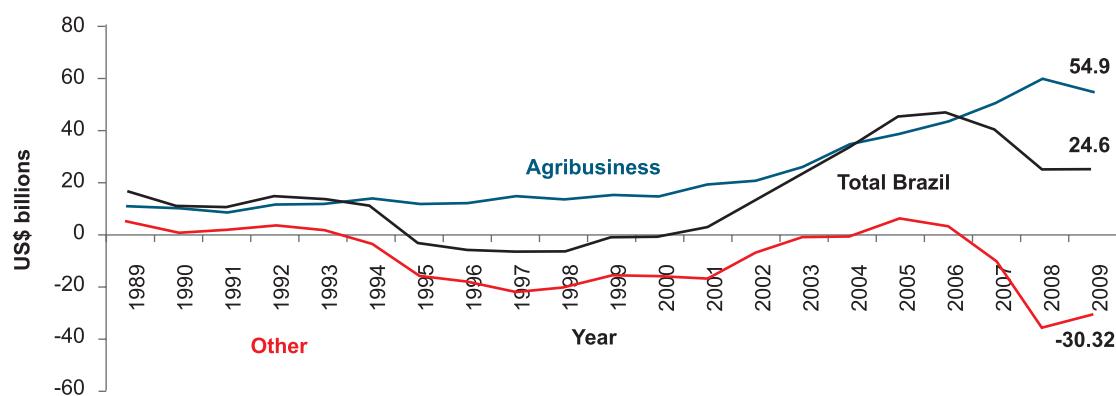


Figure 11. Balance of agribusiness trade in the period 1989–2009.

Source: Brasil (2010b).

Table 10. Main trends of production of grains, cereals, meats, and others⁽¹⁾ for the period 2019–2020.

Grain	Millions of tons		Meat	Millions of tons	
	2008–2009	2019–2020		2008–2009	2019–2020
Corn	50.97	70.12	Chicken	11.13	16.63
Soybean	57.09	81.95			
Wheat	5.67	7.07	Beef	7.83	9.92
Rice	12.63	14.12			
Beans	3.48	4.27	Pork	3.19	3.95
Total	129.84	177.52⁽²⁾	Total	22.14	30.5⁽³⁾

⁽¹⁾ Sugar – more 15.2 million tons; ethanol – more 35.2 billion liters; milk – more 7.4 billion liters.

⁽²⁾ More 47.7 million tons (36.7%).

⁽³⁾ More 8.4 million tons (37.75%).

Source: Brasil (2010a).

bean and corn production increases indicate that 52.0% and 80.0%, respectively, of this increase will be absorbed by the domestic market. As a result, there will be domestic production pressure from exports and from the domestic market.

There will also be an increase in the domestic demand for meat. Projections for chicken, beef and pork indicate that 65.3%, 77.0% and 80.0% of this increase, respectively, will be absorbed by the domestic market. Hence, although Brazil is the most, or one of the most important exporters of many of those agribusi-

ness products, domestic consumption will be the main final destination of production.

Projections show that there will be a significant change in Brazil's worldwide market ranking. The relationship between Brazilian exports and world trade shows that in 2018/2019 the Brazilian beef exports will account for 30% of worldwide trade; pork, 14.0% of trade; and chicken, 48%. These results show that Brazil will maintain its rank as first worldwide exporter of beef and chicken (Table 11).

Table 11. Brazil's share in worldwide food trade (in %)⁽¹⁾.

Product	2009–2010	2013–2014	2014–2015	2019–2020
Sugar	46.5	46.5	46.5	46.5
Green coffee beans	27.2	27.2	27.2	27.2
Soybean	30.2	31.9	32.5	35.8
Soybean meal	22.1	20.7	20.5	19.5
Soybean oil	21.1	16.2	16.4	17.8
Corn	10.1	10.9	11.2	12.7
Beef	25.0	30.9	30.7	30.3
Pork	12.4	14.0	13.9	14.2
Chicken	41.4	47.7	48.0	48.1

⁽¹⁾ Obtained from the relationship between Brazilian exports and worldwide exports. For coffee, we maintained the same position as in 2009–2010, as there are no projections for that product.

Source: Usda (2010) and AGE/Mapa (BRASIL, 2010a).

Final considerations

This article gives rise to the following considerations:

- The Brazilian industrialization policy played a fundamental role in the modernization of agriculture, creating in the cities a demand for food and inputs. The cost of labor in rural areas increased with the rural-urban migration, forcing farmers to intensify production and to mechanize their plantations. Over the last years, improved macroeconomic fundamentals, i.e. inflation control and fluctuating exchange rates, boosted the sector's production growth and enabled greater opening for foreign trade.
- In the agricultural policy area, three instruments were used to modernize agriculture: i) subsidized credit to buy modern inputs and to finance capital; ii) investments in science and technology made by Embrapa, by state research systems and by post-graduate courses; and iii) public rural extension, and more recently private rural extension. Besides government policies, additional factors that helped boost agriculture efficiency: abundant availability of production factors, such as low-cost and arable land, greater availability of modern raw materials and entrepreneurs, which were especially small-size producers.
- The analysis of data for the five major grains (rice, corn, beans, soybean and wheat) shows that in the period 1975–2010, farmed area increased 0.88% annually, while production 3.66%, and productivity 2.95%. Soybean crops are the key-product with annual area expansion of 3.58%, 5.55% production increase and 1.90% productivity increase. Unlike rice – which is the first crop grown in the Cerrado before other crops or pasture are planted – soybean was introduced in Brazil as a modern crop with efficient production systems.
- Meat production had an extraordinary growth over the last three decades. From 1979 to 2009, beef production increased 5.42% annually; pork 4.66%, and chicken 8.45%. From 2002 to 2009, beef, chicken and pork increased 3.1%, 7.25% and 1.97% annually, respectively. This dynamics is related to the evolution of exports, and could have had a better performance if it were not for the international economic crisis that started in 2008, which had a considerable impact on Brazilian exports.
- Traditional sugarcane crops showed incomparable competitiveness for the production of sugar and hydrated ethanol. Sugar exports benefitted from the gradual opening of foreign trade, where beet sugar production in the European Union was granted less subsidies. Hydrated ethanol gained force with the launch of flex-fuel cars in the domestic market. Over the last years, sugarcane production increased approximately 9.0% annually.
- Furthermore, in addition to the positive performance of crops and meat, this study also presented estimates on the evolution of Brazilian total factor productivity, which is a global model of higher agricultural efficiency. For the period 1970–2006, product's growth rate was 3.48%, and inputs 1.19% annually. More recently (1995–2006), growth rates were 3.14% for product and 0.99% for inputs. For the period in general, total factor productivity reached 2.27% annually, and more recently 2.13% annually.
- Brazilian exports experienced strong changes over the last 11 years. The most visible one occurred in product ranking and products destination. Another important aspect in terms of the foreign market was the greater opening of agribusiness.

The relationship between agribusiness exports and the their share of the GDP jumped from 2.67% in 1994 to 17.22% in 2009.

- Projections made by international institutes and the Strategic Management Advisory Office of the Ministry of Agriculture show that Brazilian agribusiness has a strong potential for growth, both in the domestic and in foreign markets. The availability of natural resources, tropical technology and entrepreneurial people are competitiveness factors. The most dynamic products of the Brazilian agribusiness in the future should be soybean, chicken, sugar, ethanol, cotton, soybean oil and cellulose. These products show high potential for growth both in terms of production and exports over the next years.
- Finally, the benefit that the growth of agriculture and agribusiness has brought to Brazil is notable, increasing the availability of food, especially animal protein which had a decisive role for exports, and more recently, for renewable energy.

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Embrapa

A successful case of institutional innovation

Eliseu Alves¹

Embrapa is a case of successful institutional innovation that has as main characteristics: a public corporation model of organization; scale of operation at national level; spatial decentralization; specialized research units; enhanced training and remuneration of human resources and a vision of an agriculture based on science and technology. Moreover, from the beginning the organization has always been result oriented. Based on the perception of one who has participated in its life from the beginning, first as one of the formulators of the Embrapa project, then as a leader for twelve years – both as director and president, and finally as a researcher, I will try to describe the main factors that paved Embrapa's road to success.

The support of the federal government

This support has been critical to the survival of Embrapa. In the early years, it took the form of the federal government having understood the importance of technology for the development of agriculture. Once the results proved Embrapa could be profitable as an option for the government, the battle for budget support remained, but it takes place in an environment where the corporation is one of the priorities of government, both in the sphere of executive and the National Congress.

In the first twelve years of its existence, Embrapa was a promise: of bold and mod-

ern design, but still a promise. During those twelve years, huge investments were made in the training of human resources and infrastructure – about six billion dollars in 2008 value. The federal government paid for this investment based on the promise that Embrapa could be for the modernization Brazilian agriculture. Without the support from the federal government, Embrapa would not have been possible.

But Embrapa's management has always been aware of the risk that the lack of achievements represented. For this, it led the research centers in a portfolio of research with short-term goals and to the conclusion of research already in progress. Moreover, it also gave special attention to the dissemination of existing results. And the media had a key role in creating the image Embrapa has. It is clear that the media not only operates on top of achievements, but also upon a consistent promise, provided it is not for long. In the early years of life of the corporation, the media bore the promise consistently, even in light of few existing results. This support was crucial to create a favorable image in society and in government. So, it has to be registered how important the development of competence to relate with the press, was for the success of the Embrapa. This relationship helped the government to justify the investment, over a period of lean achievements.

Figure 1 shows the support given by the government in terms of total spending of Embrapa (government support was 90–95% of

¹ Eliseu Alves is an advisor to the President and a researcher with Embrapa. Translated into English by Maurício Lopes.

the budget during this period). It grew rapidly in the period 1974–1982, reached a ceiling in 1982, and experienced a fall in the period 1983 to 1984. It subsequently grew, with smooth swings, from 1985 to 1996, which was the peak year during the period from 1974 to 2008. A fall was observed in the period 1997–2002, but this was greatly influenced by the macroeconomic adjustments of the Real Plan. In 2003, spending resumed a growing trend.

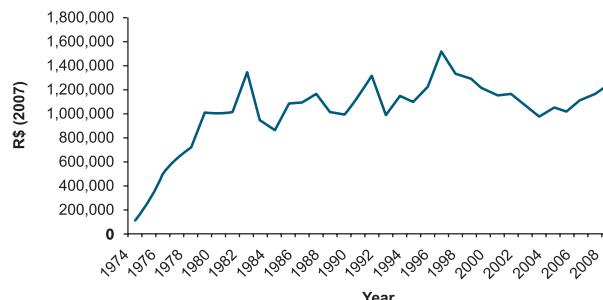


Figure 1. Government expenditures with Embrapa in reais for 2007 (values adjusted by the IGP-DI; PLOA + PAC in current values).

Source: Embrapa/DAF.

In a period of many macroeconomic imbalances and non-orthodox policies to deal with them, it is surprising that Embrapa's budget support did not falter, which only shows the decisive support the federal government gave to it. At the stage where Embrapa was only a promise, the expenditures of Embrapa evolved linearly until 1982. This was essential to consolidate its image. From 1982 onwards, the corporation was no longer a promise, and its success will explain the government's continued investments.

The impact of the theory of induced innovation

The theory of induced innovation emphasizes the interaction of farmers with the re-

searchers; this interaction indicates the priorities for research, within public research institutions. For private research institutions the market acts directly, otherwise, the technology developed would not find buyers.

In the public research, the market influence is indirect. It creates, among farmers, demand for certain type of technology, say the technology that saves land, and farmers, responding to that demand, signalize their needs to researchers, who respond with research that generates technologies that increase the productivity of land. Labor is now the expensive component, as compared to land, so farmers are pressuring the researchers for technology that replace men by machines, and scientists respond in line with the demands outlined by decision-makers, directly or in specialized publications or the media.

At the macro level, it is important to understand if the macro economic conditions require an institution of research. At the beginning of the 1970s, conditions were ripe for Embrapa: there was a food supply crisis, mainly caused by a rapid displacement of the population from rural to urban areas. This also caused high prices for basic foodstuffs, queues in supermarkets, social unrest. Any increase in production would also find a readily available opportunity to increase exports, which would help to keep the high rates of growth the economy, was experiencing at the time. Alongside this, the conviction existed that increasing the area used for cultivation and pastures would not be enough to keep pace with the rates of economic growth at the time and potential demand. Still, the stock of knowledge was largely insufficient. So, on the macro economic level, there was enough pressure and understanding to reform public research in agriculture: a typical case of induction of institutional reform, as provided by Hayami-Ruttan (1971). Thus, Embrapa was created, when conditions were very favorable for its success.

To facilitate the interaction with farmers and society, the model chosen was decentral-

ized in the territorial dimension and organized by priorities in the following order: level of product, resources and themes.

At national level, the model requires strong interaction with decision-makers, at the level of Presidency of the Republic, Congress and Ministries. Embrapa gave priority to have staff capable of interacting with the political powers and other agencies as equals, in terms of competence. Embrapa gave priority to transparency, to assessing the social and economic impact of its investments, and moreover has always given priority to dealing with the media. Even more, Embrapa is prepared to capture, interpret and internalize the signals coming from a society as complex as ours, and also to the international market, since the needs of interaction crosses national borders.

Option by the public corporation model

The option taken in 1972, to organize Embrapa as a public corporation, was a bold decision of the government to release Embrapa from the bureaucratic rules used in the public administration. This gave it the flexibility to administer resources and personnel, to plan, to assess performance, to implement the budget, to disseminate results and to be transparent.

The model allowed Embrapa to develop its own personality, which has characterized it in the national and international scenario as an unique example in the field of public research. This personality obviously is derived from the results collected, which facilitated Embrapa's relationship with the government and helped it to gain the sympathy of society. The symbol of that personality is crystallized in the brand-name Embrapa, which today opens the door to the relationships with institutions from government, private sector and a large number of countries.

Choosing CLT² gave much more flexibility in the administration of personnel, construction of several careers, especially that of researcher, and in designing and implementing a personnel evaluation policy. As a public corporation, the relationship with the outside world and with the particular initiative is much easier.

Scale and decentralization

Many wished that Embrapa would be small and only coordinated a research program run by the existing institutes and universities. This option was rejected because it was soon realized that, in a country of continental dimensions, the success of Embrapa depend on its size and an accumulated critical mass of researchers, diverse for talent, and branched throughout the national territory. It was understood that Embrapa needed to have the scale as large as Brazil and that it needed to have its own research network, so it could be direct responsible for the results, allowing it to be well known and evaluated on its own merits. This model would also allow for it to seek cooperation with universities, research institutes, private sector and overseas in a position of equals. Being large, diverse and decentralized, Embrapa would have conditions to represent the federal government in an area as important as agriculture and receive priority, both in the allocation of resources and with regard to institutional development.

It was very important for Embrapa to have a presence throughout the national territory. This presence helped to attract sympathy of the state governments and the National Congress. Embrapa has a marked the presence in the Federal District. Here are located Embrapa's Headquarters, Embrapa Cerrados, Embrapa Vegetables, Embrapa Genetic Resources and Biotechnology, Embrapa Agroenergy, and Embrapa Technology Transfer with its Business and Dissemination of Technology Offices. The units in the Federal District are an important window of

² CLT – Hiring of personnel using laws governing the private sector instead of civil service laws.

Embrapa. Being in the proximity of power, they have had important role in helping establish and solidify the image of the corporation near the central power and the international market.

A concentrate organization model for the research units

Embrapa research units are distributed throughout the national territory and are specialized in products, resources and themes. For example, farmers know that the unit responsible for maize research is Embrapa Maize & Sorghum, located in Sete Lagoas, Minas Gerais. Maize producers know where to go with demands for information and results, which will give them ownership in the center, providing help with the political leadership and the economic area of government. Similarly, researchers have the exact notion of their responsibilities, and no ambiguities regarding goals and actions needed. Even more, there are strong ties of solidarity and spirit of corps, as if all employees are committed to having a winning team. Thus, Embrapa's model has aimed to facilitate and encourage the interaction researcher-farmer and researcher-society. It had an important role in preventing the dispersal of efforts, which is one of his pillars, and is an objective way of identifying priorities for research.

Human resources

The human resources policy is one of the main reasons for Embrapa success. The policy aims to develop the human capital of the corporation and it is from this capital that Embrapa derives its success. To stimulate creativity and by creating an environment that encourages coexistence is another specific role of this policy. The policy is based on the following specific points:

- 1) The establishment of a career that stimulates the desire to study and progress.

³ The health plan is for all employers, and its reason for being applies to all.

It has three levels (called positions), where the level I is for someone who holds only a bachelor degree, level II for those with master's and, finally, level III is for those who hold doctorate degree. Each level has several sublevels.

- 2) A level of salary that allows the researcher to have a dignified living with his family based on the salary Embrapa pays him.
- 3) A retirement plan, with voluntary membership, paid by Embrapa and the employee, to support old age. The plan aims to supplement the retirement of the public social security.
- 4) A health plan paid by Embrapa and the employers, with two purposes: support the researchers and his families for expenses in health care, and preserve the health of researchers, which is the most important capital of the corporation³.
- 5) A series of activities to stimulate the researcher to accumulate knowledge and experience, allowing him or her to be productive and to love the Embrapa. There is a complex system of promotion on merit, based on individual, group and the research unity. The aphorism, ingrained in Embrapa, says that every year it has to deliver technologies to justify to society the investments made and produce better-trained researchers. Thus, there are two products that Embrapa has to deliver – researchers always more competent and technologies.
- 6) A training program at post-graduate and post-doctor levels, that meets both the interests of the corporation and researchers, and which seeks to train them at the same levels of the best centers of advanced countries.

7) The corporation recognizes that the technology generated incorporates the effort of all its employees. Thus, the training program is available for everyone, but post-graduate training focuses on researchers, but it is not exclusive of them.

8) Each research unit has a critical mass of researchers. It is organized around a specific target audience, a clear main problem to solve and the team's responsibility towards society. Each unit is in itself an instrument of concentrated effort in research and provides a work environment that encourages human development, creativity and sense of usefulness to society.

9) Embrapa seeks to stimulate the researcher to be an entrepreneur in his field, to seek resources, to interact with the outside world and ensure the dissemination of technology. Commands another aphorism: research results in the drawer of the researcher, means that; it did not result in anything or the researcher is not good enough, or both.

10) Embrapa's communication program aims to provide accountability for work, actions to disseminate research results, giving the corporation visibility and transparency and valuing its employers. This communication program is organized around many ceremonies, some connected with the anniversary of the corporation and the research units, carried out in other seminars, symposiums in Brazil and abroad, and they all provide opportunities for learning and enhancing the employers. Thus, the communication program is also considered part of the human resource development policy, but with independent living.

11) Although the corporation is always looking for opportunities to improve its human capital, one has to plan for the future and the principle of orderly replacement has to prevail. In Embrapa's case the goal is to maintain an average age of 45 years old for the PhDs, imagining the following guideline: on the average a researcher should be finish his Ph.D. work around 30 years old, which would leave him with a horizon of around 30 years of productive work. Half of this is 15. So, 15 years should be added to 30, comprising 45 years. Thus, on average, a young doctor has 15 years of work alongside senior researchers. A complementary strategy is for the creation of conditions that would allow for competent and outstanding retiring researchers to continue doing some kind of work with Embrapa. There is much to be done in this regard.

12) In the beginning, an enormous effort was made to integrate the researchers to the spirit of Embrapa, in training courses, meetings and direct communication from the direction of the corporation. As the corporation was young, a world of opportunity was opened to those who joined the effort. The leadership did not have time to stratify on a separate level. For this and by having the support of society, there were no major difficulties to develop the spirit Embrapa. Today, the fame of Embrapa helps to develop the spirit Embrapa, but we should not overlook this point.

In research, it is natural over time that seniority develops, that is how leadership solidifies, founded on knowledge and recognition. If these leaders do not have the ability to integrate with new researchers as part of their work, they will be disappointed to learn that they have no help to develop their careers. This disappointment can be transformed into rancor, leading quickly to an anti Embrapa attitude. This kind of problem cannot be solved by employing more

democratic procedures. What should be done is to find mechanisms for promotion for those who can work in teams and spread their knowledge. Procedures have no place in making a competent researcher share more than what he has already reported in text or oral communication. However, a competent researcher has much more to offer.

Independence from politics

Independence from politics does not mean isolating itself from politicians. It means to have a close relationship with them, but having the nation interests first. This independence has been built over the life of Embrapa. There were crisis, few but they happened, caused by interference from those who wanted to force the corporation to violate its principles. But they were overcome with skill. There was a leader who went against the principles of the model, but he was soon replaced.

Embrapa has found a form of coexistence with power, which has guaranteed independent and competent leaders. Hiring by open public selection and the process of selecting the leaders of the research units are instruments that have promoted coexistence with the politicians.

Politicians represent Brazilian society. For this, it is important that they take part of Embrapa's life, as it pertains to directions, priorities for research and institutional development. We must learn to work with them, understand their role and help them understand our role. In an organized way, it is necessary for Embrapa to have a presence in the National Congress, taking part of the work of committees, when convened, and lobby for the allocation of resources for science and technology.

International opening

Embrapa was open to the outside very early in its life, when the external exposure of the Brazilian economy was still very small. This

openness was very important for the following reasons:

- a) Helped to create the image of the corporation abroad, thus facilitating the relationship with the donors, countries, universities and organizations of research. The good image abroad has had strong repercussions in the federal government bringing dividends in terms of support and budget.
- b) It gave an international dimension to Embrapa, in terms of horizon, quality of research, and as an instrument of foreign policy of the country.
- c) Created new parameters for measuring performance of scientists, in terms of self-evaluation.
- d) Helped in the understanding that in a globalized world science is also globalized and it is very important to improve the relationship mechanisms with the outside world, in terms of countries, universities, funding bodies, organizations and research up to the scientist-scientist level.

Embrapa, throughout its life, keeps a strong post-graduation program, sending researchers to several countries, the vast majority to the United States and Europe, and to a lesser extent to United Kingdom, Canada, Spain, Holland, Germany and Australia. The good performance of students helped to form important relationship bridges with the academic world abroad.

Projects financed by the World Bank, Inter-American Development Bank and Japanese government have been very important to equip Embrapa and to finance the post-graduation program. Furthermore, because they have been well implemented, helped to solidify the image of Embrapa, as a serious and responsible corporation.

Embrapa has agreements with several countries and research organizations. In the United States, with several major universities

and the USDA; in France, with the INRA, CIRAD and IRD, and in Japan, with JICA and JIRCAS. At project level, there are numerous agreements involving several countries. Recently, Embrapa has extended its actions to Africa and Venezuela.

The ties of Embrapa with the CGIAR extends to its origin, and the relationship with the International Centers has brought many good results for both sides, and this relationship especially at the beginning of Embrapa, was very important to set directions for research and for training scientists. In Embrapa's mature phase, the relationship is still very important for Brazil and for joint work in Africa, Latin America and Asia.

Aiming to establish the presence of Embrapa abroad, Embrapa has created the Virtual Labs Abroad (Labex). Initially, in the United States, through an agreement with ARS USDA. This agreement has allowed Embrapa to have senior scientists working together with American scientists, and also seeks to establish permanent links between scientists of both countries. There is a detailed plan setting out goals and topics of work. Similarly, American scientists may work in Brazil: it is a two-way bridge.

Given the success of Labex in the United States, Labex Europe was created based in Montpellier (France), with further presence in Holland and England, more recently, by separate agreements with these countries. It is under study the creation of Labex Asia, thus covering the presence of Embrapa scientists at the three major regions of knowledge generation in the world: North America, Western Europe and Asia.

The success of Brazilian tropical agriculture motivates poor countries to seek information and support for technology transfer from Embrapa. Besides the traditional instruments of support, the direction of the Corporation has decided to have researchers in less developed countries, creating Embrapa Africa, in Accra (Ghana) and Embrapa Venezuela, in Caracas. It is also planned to create a structure in Cen-

tral America, at the request of the governments of that region, to work with countries of Latin America and the Caribbean. The goal is to transfer knowledge and technology in tropical agriculture and to look for opportunities in licensing Embrapa's technology.

Both the Labex model – sharing research with developed countries – or the structures of transfer of technology in developing countries, are flexible models that can be expanded with new scientists or by transfers of scientists among countries, according to the interests of Embrapa. The goal is both benefiting agriculture and helping to combat hunger in developing countries⁴.

Decisive results

Achievements are what have consolidated Embrapa with the government and public opinion. But there was a result that has been decisive in shaping the brand Embrapa. It happened: the redemption of the cerrado (Brazilian savannah) for modern agriculture. The contribution of Embrapa has been fundamental and was perceived by society that its participation was crucial for the success of agriculture in the cerrado, in terms of new varieties, cultural practices, zoning, tillage, biological fixation of nitrogen, development of livestock for both meat and milk, vegetables, fruit, irrigation and knowledge of the cerrado natural resources basis.

With the inauguration of Brasília in 1961, the federal government undertook the construction of a road and rail network, linking the capital to key cities in the South, Southeast, Northeast and North regions. It also built airports and the communication infrastructure.

The federal government created a program of credit on large scale, which financed the recovery of land and introduction of modern agriculture. As the region was almost a demographic vacuum, the program stimulated migration of farmers from southern Brazil for the

⁴This section had the cooperation of Elísio Contini, Head of ACI and a researcher with Embrapa.

cerrado. Afterwards farmers from the Southeast also came. Much more advanced in modern agriculture than the native population, migrants sold their small properties, bought much larger areas and opened the land, creating the agriculture that now characterizes the region. Few natives became modern farmers. It is important to note that since the migrants had experience in managing agriculture, they immediately sought to apply the technologies developed by the research institutions. Therefore, the cerrado is a typical case of replacement of the local culture by another, more agriculturally advanced.

Embrapa has major research centers in the Central-West region, where the capital Brasília is located. These centers sought and still seek to resolve problems of the cerrados. Embrapa Cerrado (specific to the cerrado), Embrapa Vegetables (crops), Embrapa Genetic Resources & Biotechnology and the headquarters of Embrapa are located in the Federal District, Brasília. Outside of Brasília, but in the Central-West, are Embrapa Western Agriculture in Dourados; Embrapa Rice & Beans, in Goiânia; and Embrapa Beef Cattle, in Campo Grande. Embrapa Maize & Sorghum in Sete Lagoas is located in the Southeast Region, but its ecosystem is also in cerrado. Thus, organically Embrapa gave high priority to the cerrado. Furthermore other centers located in the southeast and south have dedicated part of their research agenda to the Cerrado. Those centers are: Embrapa Soybean, in Londrina; Embrapa Wheat, in Passo Fundo; and Embrapa Dairy Cattle.

The federal government established universities and post-graduate courses in all states of Cerrado region – Distrito Federal, Goiás, Tocantins, Mato Grosso and Mato Grosso do Sul and stimulated the universities from other regions to invest in research to solve problems of the cerrado. These universities with Embrapa created a network capable of carrying out research with depth and quality.

It was very important the cooperation of the United States, Japan, France, the World Bank and Inter-American Development Bank,

but also of the system CGIAR International Centers. The development of the cerrado exemplifies a success story of international cooperation: the governments and research institutions such as universities and international centers.

In the 1970s, prices of grain and meat were very high, and those high prices in conjunction with ample and subsidized credit, contributed to modern agriculture, which has a large capacity to respond to incentives, that quickly overcame the traditional extensive model of exploitation. There was, in the period 1970–2008 alternation of high and low prices. In those periods of high prices, modern agriculture has gained ground. In bad times, it held position, but never went back. But it is noted that high prices led to modern agriculture, because the technology base had been established.

Exposure to the media

The Embrapa has always been focused on results, and results that are easily understood by society. However, the question is: what makes a result to be easily understood by society? This is a complex issue that has much to do with daily needs such as cheaper food, but also has much to do with symbols, such as those related to national pride: being the largest exporter, have high rates of productivity growth and have a powerful agribusiness. Thus, between the success of the scientist who created a given technology, and the propagation of this success by the media, a large time-frame exists, in which the scientific event is transformed to be understood by the public as a success, at the appropriate dimension; be it international, national, regional or local levels. Even more, to make it a symbol of national pride, where appropriate.

Two groups of organizations are involved: Embrapa, with its specialized staff, and the media. The specialized staff is required to link the media to the results achieved, or to facilitate and stimulate the connection when it is already in progress. Thus, the relationship of Embrapa-media is a very specialized task and requires special talents.

The second group of organization is the media that has great interest in disseminating news and in reviewing the accuracy and originality of them, but has difficulties with the technical jargon and the way scientists communicate.

Placed in another way, the media is a complex set of private organizations, multiple objectives, which may be interested in disseminating the news that Embrapa creates, because their customers so demand. Scientists of Embrapa also want to reach society with its results. It is the responsibility of Embrapa communication professionals to establish the means and processes by which the connection between the media and Embrapa takes place with the minimum of noise as possible.

From the beginning, Embrapa sought to develop a group of competent professionals, as well trained in their areas of expertise as their scientists. This group supported and gave it prestige. This has helped to create strong ties between the corporation and the media: results were well publicized, both in Brazil and abroad. And more than one can imagine, Embrapa has become a symbol of national success. And it gave Embrapa an international dimension.

How to measure the impact of communication?

If all the knowledge inputs were incorporated in the growth of them, their growth would equal the growth of the product, and the difference between the two rates of growth – growth rate of input and product – would be zero. Note that one pays for the knowledge incorporated in the input, when one makes a purchase. If the rate of output growth is greater than that of input means that the society is benefited without having to pay for the cost of generating the new inputs. Where is the gain? Of the knowledge that are not incorporated in the inputs.

Example – A new cultivar of soybeans is created, the new cultivar incorporates new

knowledge, and the market will charge the price to sell the seed. Furthermore, it is found that there is a better spacing to make the planting. In case the new spacing is not incorporated in the seed, it also applies to other cultivars. And the market will not charge the price of the new spacing. What is the gain? In this case is simple. Let us say that productivity grew by 5% because of the new spacing. The gain, free of payment, is 5%. Who has this gain? Society has. How was this possible, since there is no free lunch? It is the work of the media, which does not charge directly for the work of diffusion and, therefore, this benefit can be attributed to all of the area of communication of Embrapa with the media. What size since is the benefit? During 2000–2007, 87% of the total productivity gains in agriculture were attributed to excess growth of inputs, by which society has not paid (GASQUES et al, 2008). Therefore, the dissemination of the results was of vital importance in boosting the productivity of agriculture, and this is genuine work of the media and from the Communication Office of Embrapa, in what concerns it.

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Public expenditures for agriculture A retrospective

José Garcia Gasques¹
Carlos Monteiro Villa Verde²
Eliana Teles Bastos³

Introduction

This article is part of the celebrations of the 150th anniversary of the Ministry of Agriculture, Livestock and Food Supply (Mapa); its purpose is to show a small part of the Ministry's history through expenditures and priorities over the years. Great changes took place over time, both in terms of improving traditional instruments, as in the creation of new ways of operating in face of complex and dynamic conditions, such as the Brazilian agriculture. An overview of these changes will be presented and previous studies about government expenditures will be used as resources (GASQUES, 2004; GASQUES; VILLA VERDE, 1991, 2003).

This study also reflects the concern of organizing, systemizing and updating information about government expenditures. First we will present a series of information that are practically unpublished, as they are part of the early days of the ministry. Later, data that has been unpublished show expenditures and their priorities over the last years.

They are important as they show the form and the amount of resources allocated to policies and programs throughout time. It was not always possible to present data in detail, given the very concept of the expenditures and how they are organized. Without doubt that recent years show there was a huge improvement of

how government expenditures with Brazil are carried out and monitored.

Data employed

The basic publication from where most information used in this study is the Federal Government Balance Sheet (1935–2009). According to information we were given, this publication first came out in 1874, as the Revenue and Expenditure Balance Sheet of the Empire, and was in effect for the period 1822–1889. Later it was called the Fiscal Year Balance Sheet and Report – Report of the General Controller of the Republic of Brazil. In 1933, it was called General Balance Sheet of the Federal Government.

The study began with the Report of the General Controller of the Republic of Brazil – Accounts of Fiscal Year 1924, published by *Imprensa Nacional*, in Rio de Janeiro, in 1925 (BRASIL, 1925). In this issue up to the 1934 Balance Sheet, amounts were shown at the currency of the time, in real and in gold. Balance Sheet registered expenditures with gold for the last time in 1934. In 1924 gold was converted into paper Money; the average rate for the fiscal year was gold 1\$ = paper 4\$500 (each real in gold corresponds to four thousand and five hundred réis in paper). For this study it was not necessary to make those conversions as different currencies were not involved, and gold and

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¹ Coordinator of Strategic Planning in the Ministry of Agriculture, Livestock and Food Supply (Mapa). E-mail: jose.gasques@agricultura.gov.br

² Economist, planning and research technician for the Institute of Applied Economic Research (Ipea), retired. E-mail: carlos.mvillaverde@gmail.com

³ Assistant to the Strategic Management Advisory Office in Mapa. E-mail: eliana.bastos@agricultura.gov.br

paper money were added to obtain total share of a cost under general expenditures.

Since the beginning, balance sheets were appended with Financial Reports, where public accounts were studied in depth. These reports were signed by the minister of Finance, and stand out in 1891, when the minister was Ruy Barbosa. He was concerned with the situation of Federal Government's account, and that is how the report about the financial situation was implemented: "The imbalance between revenue and expenditure is a chronic infirmity in our national existence" (BRASIL, 1891, p. 11). There are yet other interesting studies authored by Ruy Barbosa about taxation, and notes about smuggling at the borders, especially at the North of Brazil.

The concept of expenditure applied is that of executed expenditure. It corresponds to expenditures actually undertaken and paid by Federal Government. In their formation, it corresponds not only to budgeted expenditure, but also those approved during the fiscal year via pertinent legal instruments. Additional clarification about this matter will be provided as necessary under this study.

In recent years and until 2009, which is the last year addressed, the General Balance Sheet of Federal Government was maintained, as well as information obtained from the Financial Administration Integrated System of the Federal Government (Siafi).

In the case of information that had to be obtained from other sources, these will be quoted in the text. It was not always possible to include all the years of a certain period, as some information was not obtained for lack of information, publication or for another reason.

Early balance sheets are published by the Ministry of Finance (MF), and over the last years, by its Secretariat of National Treasury (STN). Part of the older information survey was carried out at the ministry's Central Library in Brasília. Recent data was obtained from Siafi (2010).

Expenditures of the Ministry of Agriculture and Federal Government in a historic context

In the years 1870–1871, the recording of the composition of Federal Government's expenditures, through the ministries of that time, show they were seven, as shown in Table 1. These years were under the period of the Empire of Brazil that was established in 1822, when the Colonial period ended, until 1899. Three ministries had higher priority in that period: the Ministry of Finance, with 38.83% of Federal Government's resources; Ministry of War, with 18.53%; and the Ministry of Agriculture, with 17.67%.

Strictly speaking, the name Ministry of Agriculture was created many years after it was created by Imperial Decree no. 1,067, of July 28, 1860 (BRASIL, 1860). The ministry was created as the State Secretary of Agriculture Business, Commerce and Public Works, and became the Ministry of Agriculture, Industry and Commerce in 1909, by Decree no. 7,501, of August 12, 1909. Hence, the name Ministry of Agriculture will be used for all periods just to facilitate the presentation.

The evolution of the structure, its attribution and names is shown in a summary append-

Table 1. Expenditures per ministry in the period 1870–1871.

Ministry	Amounts (thousands of réis)	Share (%)
Home Affairs (formerly Empire)	4,708,500.41	4.54
Justice	3,616,030.16	3.49
Foreign Affairs (formerly Foreigners)	1,100,385.34	1.06
Navy	12,854,670.91	12.40
War	19,210,732.34	18.53
Agriculture	18,323,196.94	17.67
Finance	40,260,776.64	38.83
Deposits	3,598,841.88	3.47
Total	103,673,134.62	100.00

Source: Brasil (1925).

ed to this article. There is also a significant work organizing changes made to the structure and attributions that took place in the ministry since it was created, carried out by the National Agriculture Library (BINAGRI, 2010). This research is in a CD filed with Mapa's library.

An almost complete part of the ministry's period for the Empire period is shown in Table 2, from 1870 to 1887. Early in this period, the ministry was 10 years old. In this period, the currency was Mil Réis, effective from the ear-

ly Colonization period (early 16th century) until October 30, 1942 (BANCO CENTRAL DO BRASIL, 2007).

Table 2 shows that Mapa's share in Federal Government costs was 17.67% in 1870–1871, and 29.49%, in 1884–1885. Reports on those years did not break down costs in manner that made it possible to see how expenditures were made. The statement was just published by each ministry.

Table 2. Share of expenditures of the Ministry of Agriculture in Federal Government expenditures.

Regime	Year	Ministry of Agriculture ⁽¹⁾	Federal Government ⁽¹⁾	Share (%)
Empire	1870–1871	18,323,196.94	103,673,134.65	17.67
Empire	1871–1872	21,824,214.24	105,151,819.88	20.75
Empire	1872–1873	25,352,071.66	127,322,504.78	19.91
Empire	1873–1874	26,098,415.75	128,118,337.30	20.37
Empire	1874–1875	26,517,863.12	133,252,048.13	19.90
Empire	1875–1876	29,248,663.06	133,441,856.14	21.92
Empire	1876–1877	33,367,804.82	143,691,510.56	23.22
Empire	1877–1878	42,116,040.18	161,379,170.20	26.10
Empire	1878–1879	47,490,746.79	190,152,454.78	24.98
Empire	1879–1880	41,717,066.18	166,957,236.75	24.99
Empire	1880–1881	36,798,932.43	152,524,588.28	24.13
Empire	1881–1882	37,334,552.55	156,749,546.46	23.82
Empire	1882–1883	43,259,316.23	165,649,758.11	26.11
Empire	1883–1884	47,878,165.86	165,119,884.83	29.00
Empire	1884–1885	50,154,614.92	170,070,596.45	29.49
Empire	1885–1886	43,135,142.32	167,819,347.96	25.70
Empire	1886–1887	68,196,081.02	260,301,689.59	26.20
Republic	1890	66,168,863.71	220,645,874.46	29.99
Republic	1891	73,294,892.38	220,592,463.58	33.23
Republic	1892	86,141,849.10	279,280,534.89	30.84

⁽¹⁾Amounts in thousands of réis.

Source: Ministry of Finance (BRASIL, 1997).

The table shows that in the first 3 years of the Republic, Ministry of Agriculture was also given high priority. Its share in Federal Government expenditures reached 30.84% in 1892. After that year, information was discontinued and restarted in 1909, to continue by combining expenditures with gold and paper until 1926 (Table 3). From this year on, expenditures were only shown as Paper. Table 3 shows these data for the period 1909–1940, as expenditures of the Ministry of Agriculture and Federal Government, as well as the share of the Ministry of Agriculture.

Since 1926, other ministries started to share resources. In that year, it is registered that the Ministry of Transport and the Ministry of Finance had a share of 61.49% of Federal Government expenditures.

In 1936, the Ministries of Education and Labor were created, representing together only 5.58% of Federal Government expenditures – 5.0% for the former and 0.58% for the latter.

Mapa's share in total expenditures reached its highest point in 1910–1913. In 1910, its share was 5.65%; in 1912, 7.64%; and in 1913, 6.61%. In other years until 1940, most frequent shares ranged from 2% to 3%.

Focusing on another period that started in 1942, when another currency became in effect – the Cruzeiro (Cr\$) – which underwent six currency changes until the Real (R\$), it is noted the strong share of the Ministry of Agriculture in Federal Government expenditures. Table 4 shows those changes in details.

The general balance sheets of Federal Government throughout time shows there were major changes, made with the purpose of improving them and to find instruments that enabled the study of where expenditures would be made. Hence, in the 1930s, it is evidenced the concern and execution of expenditures with better-defined purposes.

Of the other changes that were made, one of the most important that was implemented in the

balance sheets of the 1950s was the creation of expenditures according to their nature, currently called expenditures per economic category. This new classification makes it possible to verify expenditure priority, which together with other recent changes, such as the identification of expenditures per program, started in the 1970s, were conducive to a significant improvement of information.

The search for the improved control of government expenditures led to another change in 1970, when expenditures were realized program. In this year, it was also observed for the first time the share of other ministries in developing specific agriculture-related activities. This is shown in Table 5.

Table 5 shows that the most important participants in the Agriculture program was the Ministry of Agriculture, which took on 70.84% of expenditures, and the Ministry of Home Affairs, with 19.40%.

Since 1975, government expenditures were realized per function. In the specific case of agriculture, they were accounted for by a function called Agriculture, Food Supply and Agrarian Organization Function (Function 4), comprising different programs. The complexity of the organization of agriculture was undoubtedly responsible for projects dedicated to that area.

The division of responsibilities between different ministries is still maintained and with a larger number of participants. Hence, the analysis of government expenditures with agriculture will no longer focus only on Mapa, but also on other ministries that are part of the Agriculture Function.

In 1999, there was an important change of methodology of government expenditures. Through that change a specific agrarian organization function was created, which until then was considered a program under the Agriculture Function. Since then, both the Agriculture Function and the Agrarian Organization Function were implemented (BRASIL, 1999b).

Table 3. Share of the expenditures of the Ministry of Agriculture in Federal Government expenditures.

Year	Ministry of Agriculture ⁽¹⁾		Federal Government ⁽¹⁾		Share (%)
	Gold	Paper	Gold	Paper	
1909	1,131:228\$161	6,728:143\$216	80,720:876\$602	372,989:973\$326	3.21
1910	1,680:751\$381	18,063:436\$424	107,957:494\$009	441,357:348\$598	5.65
1911	2,696:049\$379	24,100:933\$998	96,530:245\$865	519,017:957\$398	7.44
1912	1,990:690\$160	34,796:750\$349	93,959:378\$269	630,684:750\$363	7.64
1913	1,251:485\$846	32,837:875\$067	108,189:145\$132	602,309:056\$428	6.61
1914	360:736\$028	17,642:714\$439	83,923:426\$099	612,113:946\$19	3.31
1915	401:463\$604	12,903:175\$561	79,022:846\$195	516,628:618\$565	3.01
1916	80:298\$832	9,911:667\$399	84,133:335\$989	496,080:249\$134	2.09
1917	37:430\$332	10,653:371\$027	99,250:542\$673	520,100:184\$25	2.09
1918	324:626\$859	16,326:303\$362	81,002:089\$568	692,602:764\$158	2.76
1919	781:776\$271	18,862:006\$287	122,274:990\$923	676,758:267\$331	3.43
1920	805:949\$176	40,279:077\$041	15,359:067\$363	827,708:050\$03	5.39
1921	130:808\$783	34,219:197\$211	82,605:721\$815	934,930:869\$378	3.82
1922	234:555\$887	40,592:613\$603	83,766:602\$447	1,074,179:793\$262	4.06
1923	223:394\$485	38,309:222\$741	75,643:976\$393	1,084,533:105\$509	3.83
1924	282:128\$091	49,434:470\$322	88,923:418\$648	1,229,666:583\$473	4.34
1925	119:063\$13	49,655:773\$83	85,727:620\$776	1,370,988:540\$557	3.76
1926	118:594\$423	48,629:242\$876	89,640:681\$672	1,481,412:926\$782	3.41
1927	-	60,690:453\$0	-	2,025,959:251\$0	3.00
1928	-	67,571:054\$0	-	2,350,106:924\$0	2.88
1929	-	68,408:086\$0	-	2,422,392:544\$0	2.82
1930	-	78,063:514\$0	-	2,515,544:094\$0	3.10
1931	-	32,917:074\$0	-	2,046,620:366\$0	1.61
1932	-	39,239:673\$0	-	2,859,668:876\$0	1.37
1933	-	54,260\$011\$0	-	3,412,750:670\$0	1.59
1934	-	47,349:086\$0	-	2,099,250:295\$0	2.26
1935	-	67,833:605\$0	-	2,872,001:486\$0	2.36
1936	-	75,526:778\$4	-	3,226,080:812\$0	2.34
1937	-	83,693:501\$6	-	4,143,958:622\$1	2.02
1939	-	169,423:188\$9	-	5,674,891:051\$2	2.99
1940	-	173,479:006\$5	-	6,137,078:591\$3	2.83

⁽¹⁾Amounts in thousands of réis.

Source: General Balance Sheet of the Federal Government (1935–2009), data provided by the Secretariat of National Treasury by request.

Table 4. Share of the expenditures of the Ministry of Agriculture in Federal Government expenditures.

Year	Currency	Ministry of Agriculture ⁽¹⁾	Federal Government ⁽¹⁾	Share (%)
1942	Cr\$	22,329,394.60	595,192,697.00	3.75
1943	Cr\$	163,574,804.53	5,934,009,080.50	2.76
1944	Cr\$	215,003,120.30	7,450,661,146.80	2.89
1945	Cr\$	297,251,129.60	9,849,491,739.70	3.02
1946	Cr\$	478,688,429.70	13,315,565,149.70	3.59
1947	Cr\$	553,671,453.10	12,518,674,119.60	4.42
1948	Cr\$	658,271,706.20	14,424,561,712.60	4.56
1949	Cr\$	942,536,288.60	20,363,319,532.80	4.63
1950	Cr\$	1,066,350,000.00	23,669,850,000.00	4.51
1951	Cr\$	1,001,347,000.00	24,609,329,000.00	4.07
1952	Cr\$	1,275,678,053.90	28,460,744,732.90	4.48
1953	Cr\$	1,970,638,517.00	39,925,491,000.00	4.94
1954	Cr\$	2,425,709,958.50	53,661,017,105.30	4.52
1955	Cr\$	3,158,697,784.20	63,286,948,715.10	4.99
1956	Cr\$	3,262,704,757.00	107,028,203,311.00	3.05
1957	Cr\$	5,370,903,972.40	118,711,590,802.90	4.52
1958	Cr\$	6,172,804,527.60	148,478,452,288.50	4.16
1959	Cr\$	7,490,848,059.80	184,273,251,360.80	4.07
1960	Cr\$	10,272,679,328.90	264,636,261,598.00	3.88
1961	Cr\$	9,501,038,280.00	419,913,963,644.40	2.26
1962	Cr\$	18,050,592,981.00	726,694,160,692.90	2.48
1965	Cr\$	83,241,630,256.00	4,414,920,023,218.00	1.89
1967	NCr\$	31,660,580,000.00	626,469,645,870.00	5.05
1969	NCr\$	281,307,023.00	18,651,501,718.56	1.51
1970	NCr\$	340,716,490.47	29,819,965,069.31	1.14
1975	Cr\$	950,658,397.83	103,838,692,473.93	0.92
1980	Cr\$	24,290,259,472.00	1,137,978,410,814.60	2.13
1983	Cr\$	378,882,268,147.00	8,537,106,422,519.00	4.44
1985	Cr\$	3,677,405,958,202.00	130,425,844,256,952.00	2.82
1988	Cz\$	230,254,225,538.77	15,857,926,137,634.50	1.45
1990	NCz\$	162,951,341,301.59	21,580,391,162,797.50	0.76
2000	R\$	2,874,349,764.05	315,420,658,792.34	0.91
2001	R\$	2,702,702,578.25	383,389,210,368.83	0.70

Continues...

Table 4. Continued.

Year	Currency	Ministry of Agriculture ⁽¹⁾	Federal Government ⁽¹⁾	Share (%)
2002	R\$	2,810,980,664.59	439,097,026,749.90	0.64
2003	R\$	2,809,732,749.92	493,362,924,760.52	0.57
2004	R\$	3,445,263,456.70	543,759,762,939.78	0.63
2005	R\$	4,607,726,414.87	606,932,712,686.75	0.76
2006	R\$	5,076,292,623.23	797,835,457,211.24	0.64
2007	R\$	5,273,722,831.84	1,165,493,791,893.96	0.45
2008	R\$	6,328,008,990.83	1,246,891,567,185.80	0.51
2009	R\$	8,977,073,262.81	1,423,883,440,562.79	0.63

⁽¹⁾ Current amounts.

Source: General Balance Sheet of Federal Government (1935–2009), data provided by the Secretariat of National Treasury by request.

Table 5. Expenditures incurred under the Agricultural program of 1970.

Budget, special and extraordinary credit			
Program	Ministry and burden	Amount (Cr\$)	%
Agricultural	Ministry of Agriculture	286,767,403.60	70.80
	Ministry of Defense	77,580.90	0.02
	Ministry of Home Affairs	78,683,874.90	19.40
	Federal Government financial burdens	35,880,000.00	8.86
	Federal Government financial burdens incurred with states, municipalities and the Federal District	3,400,000.00	0.84
	Total	404,808,859.40	100.00
Federal Government total expenditures with all programs			28,115,660,159.00

Source: General Balance Sheet of Federal Government (1935–2009), data provided by the Secretariat of National Treasury by request.

The division of attributions

The expressive change in attributions took place in 2001. Provisional Measure no. 2,123-30, of March 27, 2001 (BRASIL, 2001) created the Ministry of Agrarian Development, the attributions of which are to foster land reform and the sustainable development of the rural segment that is comprised by family farmers. Although this new ministry was created in 2001, its minister was appointed in 1996 as extraordinary minister for land policy.

Under this new configuration, Mapa concentrates the agricultural policy as one of its most important areas of competence, and MDA the rural development strategy.

Together with this change, as of 2000, under the public expenditure point of view, the agrarian organization became a new function in the list of tax budget accounts and social security (Figure 1).

As a rule, Mapa has been the principal ministry of the Agriculture Function. In the last

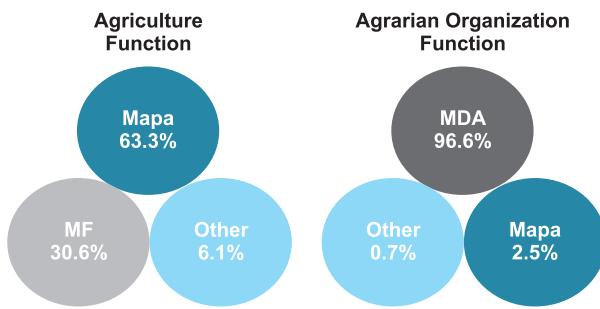


Figure 1. Division of Mapa and MDA attributions.

Source: General Balance Sheet of Federal Government (1935–2009), data provided by the Secretariat of National Treasury by request, and Siafi (2010).

10 years, it was only in 2003 and 2004 that it had a lower share than the Ministry of Finance expenditures in the Agriculture Function – in 2003, it was 43.2%, and in 2004, 45.1%. In 2008 and 2009, its share was 66.8% and 63.3%, respectively (Table 6). Figure 1 shows that 30.6% of Agriculture Function expenditures are under the responsibility of the Ministry of Finance. These accounts refer to those that according to the relevant legislation are granted a degree of economic subvention via lower interest rates or protection by trading instruments. In the Agrarian Organization Function, the Ministry of Development had the greatest share, 96.6% (Table 7).

Table 6. Expenditures incurred by a higher agency in the Agriculture Function (millions of reais for 2009)⁽¹⁾.

Year	Ministry			
	Agriculture	Finance	Other	Total
2000	6,203.60	3,799.20	966.10	10,968.90
2001	5,285.50	4,317.20	1,117.20	10,719.90
2002	4,843.20	4,003.00	630.70	9,476.90
2003	3,942.30	4,795.20	390.50	9,128.10
2004	4,418.60	4,982.50	391.90	9,792.90
2005	5,576.80	3,937.40	697.70	10,211.80
2006	6,039.70	5,375.50	402.40	11,817.60
2007	5,971.10	5,691.40	964.60	12,627.10
2008	6,458.20	2,382.90	829.40	9,670.40
2009	8,977.10	4,335.40	868.80	14,181.30

⁽¹⁾ Amounts deflated by FGV's IGP-DI.

Source: General Balance Sheet of Federal Government (1935–2009), data provided by the Secretariat of National Treasury by request, and Siafi (2010).

Table 7. Expenditures incurred by a higher agency in the Agrarian Organization Function (millions of reais for 2009)⁽¹⁾.

Year	Ministry		
	Agrarian Development	Other	Total
2000	2,357.60	2.2	2,359.80
2001	2,594.50	6.4	2,600.90
2002	2,371.00	7.8	2,378.70
2003	2,002.50	3.2	2,005.70
2004	3,341.50	15.6	3,357.10
2005	4,376.80	14.7	4,391.50
2006	4,851.80	132.6	4,984.40
2007	5,309.10	104.7	5,413.70
2008	4,387.60	147.8	4,535.40
2009	4,611.40	149.0	4,760.50

⁽¹⁾ Amounts deflated by FGV's IGP-DI.

Source: General Balance Sheet of Federal Government (1935–2009), data provided by the Secretariat of National Treasury by request, and Siafi (2010).

Mapa expenditures per economic category

The distribution of Mapa's total expenditures for years recorded in Table 8 show that the nature of activities carried out by the ministry defines a division tending to current expenditures, which are those typically consumed during 1 fiscal year. In general, they have accounted for 50%–60% of total expenditures. There were some years, such as in 1975 and 1985, where those expenditures were more significant, reaching over 70.0% of the ministry's total expenditures.

In turn, capital expenditures, that encompass within its scope expenditures items with a longer-lasting purpose, which are not consumed within a fiscal year. These expenditures have varied from 26.58% to 49.9%. High expenditure share of capital in 2009 was basically due to the significance of two accounts: the formation of public inventory within the scope of the Minimum Price Guarantee Policy (PGPM) and the funding of costs, investment, harvest and pre-trading of coffee. In 2009, these two accounts absorbed 48.5% of Mapa's total resources.

Overall framework of changes – new programs and new instruments

Major changes on government expenditures have taken place over the last years. This section of the study presents an overall framework from 1988 to 2009. Different occurrences over this period were evaluated in other studies and for this reason some details will not be addressed to avoid redundancy (GASQUES et al., 2006a, 2006b).

However, before showing the trend of major changes that interfered in government expenditures, Table 9 summarizes a series that will help to observe how expenditures behaved. The table shows the agriculture accounts under different names; as aforementioned, since 2000 they detain Agriculture Functions and Agrarian Organization Functions. Another point to be noted is that from here on Mapa will not be re-

ferred to alone, as different ministries also have a share in expenditures incurred by the rural sector, as shown in Figure 1 and in other sections of this study.

Table 9 shows the first overview of agriculture and agrarian organization expenditures. It also provides other information, such as Federal Government expenditures and the GDP to help the reader identify them as needed. The table begins in 1988 for a very important reason; it was in that year, starting in January 1st, that the budget unification was implemented, centralizing expenditures related to agriculture funds and programs that used to be managed by the Central Bank of Brazil under the Ministry of Finance, under the responsibility of the Secretariat of National Treasury. The unification occurred by Decrees nos. 94,442–94,444, of June 12, 1987 (BRASIL, 1987a, 1987b, 1987c).

Table 8. Mapa's expenditures per economic category in current amounts.

Year	Currency	Current expense	Capital expenditure	Total	Percentage from total	Total
1956	Cr\$	1,914,147,573	59.74	1,289,895,755	40.26	3,204,043,328
1957	Cr\$	3,205,482,189	60.16	2,123,090,622	39.84	5,328,572,810
1958	Cr\$	3,698,745,861	60.88	2,376,489,374	39.12	6,075,235,235
1959	Cr\$	4,025,614,672	54.20	3,402,273,681	45.80	7,427,888,353
1960	Cr\$	5,762,681,818	56.29	4,474,444,311	43.71	10,237,126,129
1967	NCr\$	117,702,480	57.68	86,373,656	42.32	204,076,136
1970	NCr\$	230,869,259	67.76	109,847,232	32.24	340,716,490
1975	Cr\$	1,181,791,545	73.42	427,790,016	26.58	1,609,581,561
1980	Cr\$	17,628,899,193	72.58	6,661,360,279	27.42	24,290,259,472
1983	Cr\$	2,311,546,405	61.01	1,477,276,276	38.99	3,788,822,682
1985	Cr\$	27,050,622,902	73.56	9,723,436,680	26.44	36,774,059,582
1988	Cz\$	155,202,988,949	67.41	75,051,236,590	32.59	230,254,225,539
1990	NCz\$	96,123,771,933	58.99	66,827,569,369	41.01	162,951,341,302
2005	R\$	2,767,127,174	50.72	2,688,518,910	49.28	5,455,646,084
2009	R\$	4,447,375,489	50.09	4,430,518,368	49.91	8,877,893,856

Source: General Balance Sheet of Federal Government (1935–2009), data provided by the Secretariat of National Treasury by request.

As shown in Table 9, Agriculture Function expenditures decreased, where Agrarian Organization Function expenditures increased. In the whole period, agriculture-related expenditures decreased to the annual rate of 4.55%, and agrarian organization expenditures increased 6.3%, annually from 1988 to 2009. From 2000 to 2009, rates were as follows: Agriculture Function 2.4%, and Agrarian Organization Function 11.0%. Hence, government expenditure was reduced exclusively in relation to Agriculture Function expenditures and not Agrarian Organization expenditures.

Some of the questions that naturally come to mind when looking at data in Table 9 are: "Why was the average of expenditures incurred with agriculture and agrarian organization so high in the period 1988–1999 compared to the next period?" and "Which were the major changes that caused government expenditures with agriculture to fall so dramatically?". There were many, but the most decisive were: a) cut of agricultural subsidies; b) the creation of new sources of rural credit and changes made to the government's performance; and c) the creation of new trade mechanisms.

The cut of agricultural subsidies for rural credit and also of other products such as sugar, alcohol and wheat. Many studies show the amount of expenditures with this policy and the economy of public resources it brought about (GASQUES, 2001, 2004). However, as well as the reduction of expenditures due to the cut of subsidies, two other chances took place in rural credit.

One was that traditional rural funding sources decreased, where sources such as mandatory resources (requirements) and free resources were then replaced by rural savings funding, external resources, the Work Support Fund (FAT) and other (BANCO CENTRAL DO BRASIL, 2009).

To these new funding sources, the industry of inputs and trading can also be added. To learn about how these new funding sources be-

came important, it is estimated that their share grew from 11.2%, in 1990, to 74.2% in 1993⁴. It was yet important to supply agriculture resources with the creation of different investment programs with favored interest rates as part of a program for rural and agroindustrial investment (BRASIL, 2005, 2006, 2007, 2008, 2009). Those include Moderfrota and Moderinfra, to mention but a few.

The other occurred for rural credit with Law no. 8,427, of 1992. This law defined funding parameters as of 1990, and through this Law the government performed based on tax equalization. Tax equalization is an economic subvention that has the purpose of covering the difference between the costs of obtaining resources from financial institutions – added with incurred administrative and tax costs – and the tax paid by the final borrower. Federal government's withdrawal from rural credit was so strong that its share in funding for producers and cooperatives fell from 68.5%, in 1985, to 0.5%, in 2009 (BANCO CENTRAL DO BRASIL, 2009).

Another factor that was responsible for the reduction of expenditures over the last years was trade instruments that pledge the private sector to trade. These instruments perform as complements to the traditional mechanisms of the minimum price guarantee policy, especially the Federal Government's Acquisitions (AGFs). The most quoted are the Prize for Product Distribution (PEP), the Prize for rubber distribution and the Options system, the expenditures of which are under the program for the Guarantee and support of trading prices (BRASIL, 2003, 2009).

There are many good studies that have addressed these trade instruments created in 1996. Four are outstanding under this text: Lopes (1995), Pereira and Prado (2002), Rezende (2000) and Villa Verde (2001). Those studies address these instruments as complements. They deal about the need to reformulate the system based on the perception that it was necessary to create new trade instruments, the efficiency of the in-

⁴Central Bank of Brazil. Rural and agroindustrial credit. Report of December 1993.

Table 9. Federal Government expenditures, GDP⁽¹⁾ and expenditures incurred by the Agriculture Function and the Agrarian Organization Function⁽²⁾.

Year	Federal Government Expenditures	GDP	Function		
			Agriculture	Agrarian Organization ⁽³⁾	Agriculture + Agrarian Organization
1988	411,377,938,590	1,876,011,780,137	31,250,424,543	4,268,044,041	35,518,468,584
1989	968,110,233,950	1,935,293,752,390	18,202,205,819	474,701,789	18,676,907,608
1990	1,388,199,899,633	1,851,108,474,161	25,811,842,953	1,116,815,716	26,928,658,669
1991	573,462,383,422	1,870,202,367,035	23,492,136,361	1,642,540,045	25,134,676,406
1992	721,135,445,274	1,861,470,113,073	17,079,859,932	1,008,008,670	18,087,868,602
1993	834,498,052,087	1,948,310,503,705	19,573,755,233	1,587,006,270	21,160,761,503
1994	604,538,252,831	2,052,240,397,490	20,198,348,202	2,094,516,142	22,292,864,345
1995	525,722,785,034	2,142,884,407,946	23,837,163,590	3,974,712,703	27,811,876,293
1996	549,467,633,083	2,188,967,112,989	15,323,281,691	3,998,935,236	19,322,216,928
1997	726,976,325,417	2,262,851,276,565	20,767,159,942	4,027,366,849	24,794,526,791
1998	829,436,126,380	2,263,651,096,631	14,146,640,543	4,206,640,540	18,353,281,083
1999	784,018,482,420	2,269,402,543,057	17,118,699,691	2,512,662,403	19,631,362,093
2000	680,757,185,546	2,367,127,257,053	10,968,878,375	2,359,761,126	13,328,639,501
2001	749,766,719,228	2,398,210,450,317	10,719,904,288	2,600,852,979	13,320,757,267
2002	756,543,475,421	2,461,957,140,452	9,476,939,946	2,378,721,300	11,855,661,246
2003	692,230,375,861	2,490,186,429,057	9,128,068,313	2,005,734,970	11,133,803,283
2004	697,375,122,561	2,632,433,158,593	9,792,897,021	3,357,121,982	13,150,019,003
2005	734,573,874,474	2,715,609,454,481	10,211,776,795	4,391,523,079	14,603,299,874
2006	949,249,326,795	2,823,067,072,621	11,817,578,634	4,984,366,471	16,801,945,105
2007	1,319,622,863,214	2,995,031,680,075	12,627,112,849	5,413,745,806	18,040,858,656
2008	1,272,537,648,775	3,148,857,550,574	9,670,438,440	4,535,416,604	14,205,855,044
2009	1,423,883,440,563	3,143,014,695,014	14,181,283,596	4,760,456,140	18,941,739,736
Annual rate (%)	2.36	2.63	-4.55	6.27	-3.07

⁽¹⁾ Gross Domestic Product.

⁽²⁾ Amounts in reais in 2009, updated based on the IGP-DI and deflated by the IGP-DI.

⁽³⁾ Until 1999, it was an Agriculture Function program. In 2000 it became the Agrarian Organization Function.

Source: Ipea (2010) and data provided by the Secretariat of National Treasury (STN) by request.

struments and changes that occurred. Further to these studies, STN/COPEC's activity reports have called the attention to the economy of resources brought by those instruments.

One of the most important results brought about by trade instruments was the reduction of expenditures with public inventories, as it was previously carried out by the government. At the same time when these instruments were introduced, especially since 1990, there was a better management of public inventories, which had a direct effect on expenditures. This point was quite influenced by the trade deregulation, which gained importance in 1990. Delgado (1995) discusses the period of trade deregulation in Brazil and its influence in the domestic agriculture policy. It shows the traditional trade instruments became inadequate when the deregulation was implemented in 1990.

Comparing physical inventory volumes of major agricultural products of 1985–1988 to inventory of 1996 shows there was a significant decrease of the AGFs (CONAB, 2010a). In the series provided by the National Supply Company (Conab), total AGFs for agricultural products between 1985 and 1988 was 32.4 million tons. Of these, the largest physical volume occurred in 1987, when the government bought 12 million tons, of which 66.4% were corn. In turn, in a 13-year period that goes from 1989 to 2001, the government acquired a total of 20.3 million tons (CONAB, 2010a). This reduction is due to the change in the trade policy adopted since 1996.

The priorities of government expenditures in the 2000s

Examining what was discussed in relation to policies and instruments with detailed perspective of government expenditures in Brazil, it was concluded that over the 20 years encompasses from 1980 to 2000, supply always chartered the priority during every intermediary periods to this longer period. From 1980 to 1999, supply accounted for the average of 41.8% of government expenditures with agriculture. This

guidance remained the same even after the Brazilian economy entered the stabilization period in 1994.

This section begins by showing and commenting on expenditures incurred by program, and to facilitate understanding, considers the year 2009. In order to include a broader scope, Agrarian Organization Function expenditures are also included. In 2009, 23 programs comprised the Agriculture Function, as shown in Table 10.

The first point to be noted is the concern with supply that remains when the priority of expenditures is verified via the programs. In 2009, average expenditures with the supply program are similar to those in the 1980s and 1990s.

In 2009, it is observed that the agricultural product supply program accounts for 41.67% of the Agriculture Function expenditures. However, in 2008, when the price of agricultural products took place and the government reduced its intervention, supply expenditures accounted for 23.3% of the Agriculture Function expenditure. The impact of the 2008 world economic crisis and low prices of agricultural products – especially corn – led to the greatest intervention to trade (CONAB, 2010b). Additional details will be provided below.

The second point is the priority given to the development of the coffee economy that since 1999 is granted support via credit (BRASIL, 1999a). In 2009, this aid accounted for 12.52% of Agriculture Function expenditures. This program is fully run by Mapa's specialized management in that area.

Family Agriculture, via the National Program for the Strengthening of Family Agriculture (Pronaf) is another priority when assessing the distribution of expenditures in 2009, but this also happens after its creation in 1995⁵. The program has a share of 11.85% of credit expenditures and those earmarked to other program activities within the Agriculture Function. In 2000, Pronaf's share in expenditures was 17.8%. Finally, administrative expenditures grouped under administrative support represented a share of 17.5%.

Table 10. Expenditures per program in 2009 for the Agriculture Function.

Program	Activity	Updated provision	Commitment issued	Incurred expenditures	Amounts paid	Share (%)
350	Development of the coffee economy	2,543,166,689.04	1,776,166,544.61	1,776,166,544.61	1,716,853,773.91	12.52
351	Family agriculture – Pronaf	2,092,504,000.00	1,681,174,708.23	1,681,174,708.23	1,151,585,593.13	11.85
352	Agricultural product supply	7,270,694,271.09	5,656,414,993.65	5,909,316,152.16	4,205,549,113.37	41.67
356	Food & beverage safety and quality	91,219,052.36	83,222,394.14	83,991,355.43	59,973,149.28	0.59
357	Agriculture health safety	179,699,789.78	123,356,872.56	124,334,714.08	91,115,979.23	0.88
360	Agricultural policy management	78,306,711.63	54,619,691.84	54,649,715.07	38,094,772.61	0.39
362	Sustainable development of cocoa producing regions	46,177,978.57	39,649,092.52	39,807,303.95	15,227,086.71	0.28
365	Agribusiness risk minimization	315,238,873.48	218,887,769.60	219,016,427.14	198,524,945.39	1.54
375	Quality of agricultural inputs and services	17,977,282.00	15,428,304.25	15,956,823.16	11,847,279.88	0.11
379	Irrigated agriculture development	689,704,071.75	567,495,095.26	568,386,255.58	214,869,660.09	4.01
393	Intellectual property system development	842,559.60	762,590.77	773,407.77	351,464.27	0.01
750	Administrative support	2,530,967,627.98	311,242,040.38	2,482,100,725.09	267,106,523.79	17.50
1062	Professional and technological education development	1,233,403.00	1,227,880.21	1,227,880.21	1,160,906.28	0.01
1156	Research and development for agribusiness competitiveness and sustainability	398,167,509.62	384,381,046.20	384,383,978.06	178,425,492.47	2.71
1161	Agricultural and agroindustrial research and development for social insertion	14,336,097.46	14,062,018.17	14,062,997.87	10,475,450.15	0.10
1342	Fishing sustainable development	245,217,842.00	144,388,525.52	144,388,525.52	45,957,822.56	1.02

Continues...

Table 10. Continued.

Program	Activity	Updated provision	Commitment issued	Incurred expenditures	Amounts paid	Share (%)
1343	Aquiculture sustainable development	43,655,393.90	25,557,444.40	11,619,165.33	0.18	
1344	Aquiculture and fishing policy management	63,105,417.32	33,789,794.59	17,191,749.39	0.24	
1409	Agroenergy development	35,121,000.68	32,177,399.16	23,486,772.96	0.23	
1426	Conservation, management and sustainable use of agrobiodiversity	4,018,565.53	3,518,916.14	2,327,123.19	0.02	
1437	Agribusiness development in world trade	5,069,100.00	3,125,380.06	3,129,948.06	2,878,930.66	0.02
1442	Agribusiness sustainable development	21,235,416.00	15,930,683.14	16,078,107.97	8,236,045.63	0.11
6003	Support to the development of the agricultural sector	712,328,943.00	567,290,394.06	567,290,394.06	14,588,488.18	4.00
Total		17,399,987,595.79	11,753,869,579.46	14,181,283,595.76	8,287,447,288.46	100.00

Source: data provided by the Secretariat of National Treasury by request.

Table 11 shows that Agrarian Organization Function expenditures per program are mainly concentrated in the credit to settle families (Settlement Project Sustainable Development) – 35.37% of total expenditures, and to obtain rural properties (Rural Worker Settlement) – 16.54% of total expenditures. Most of the other resources are mainly allocated to land credit – 10.81%. Two other programs – Technical Assistance and Rural Extension –, and Rural Territory Sustainable

Development were granted 16.18% of resources, allocated to a great number of small projects.

Despite the fact that only programs that involved a more significant amount were brought to attention, especially agriculture-related ones, there are many programs where the amount of resources are relatively small compared to others, but that are greatly important for the growth, competitiveness and quality of food. This group

Table 11. Expenditures per program in 2009, Agrarian Organization Function.

Program	Activity	Updated provision	Commitment issued	Incurred expenditures	Amounts paid	Share (%)
135	Rural worker settlements	1,019,414,814.80	787,355,679.98	787,354,630.30	751,607,008.11	16.54
137	Sustainable development of settlement projects	1,748,161,444.31	1,683,732,260.83	1,683,732,518.58	646,139,954.18	35.37
138	Land structure management and destination of public land	222,772,866.04	106,566,514.25	106,566,542.25	30,859,437.35	2.24
139	Agrarian development management policy	36,891,150.09	19,790,039.16	19,790,039.16	15,099,453.63	0.42
351	Family agriculture – Pronaf	284,391,716.93	262,850,413.65	262,853,896.98	191,313,614.88	5.52
750	Administrative support	583,235,797.33	159,069,565.66	557,005,434.55	121,622,933.52	11.70
1116	Land credit	533,822,870.26	514,656,866.86	514,656,866.86	70,665,855.83	10.81
1120	Peace in the field	15,411,636.00	7,886,617.24	7,887,217.24	6,522,374.58	0.17
1334	Sustainable development in rural regions	458,848,871.00	381,461,650.37	381,461,650.37	43,811,420.99	8.01
1336	Brasil quilombola	42,521,495.31	6,208,228.36	6,208,228.36	4,624,797.43	0.13
1350	Rural education – Agrarian Reform National Education Program (Pronera)	70,212,027.42	23,071,032.41	23,071,032.41	10,789,087.44	0.48

Continues...

⁵ Program created in August 24, 1995, by Resolution no. 22,191 of the National Monetary Council.

Table 11. Continued.

Program	Activity	Updated provision	Commitment issued	Incurred expenditures	Amounts paid	Share (%)
1426	Conservation, management and sustainable use of agrobiodiversity	1,250,000.00	450,000.00	450,000.00	-	0.01
1427	Technical assistance and rural extension in family agriculture	505,842,295.59	388,789,143.13	388,789,291.63	116,304,293.41	8.17
1433	Citizenship and implementation of women's rights	33,065,744.00	20,628,791.41	20,628,791.41	11,481,179.83	0.43
Total		5,555,842,729.08	4,362,516,803.31	4,760,456,140.10	2,020,841,411.18	100.00

Source: data provided by the Secretariat of National Treasury by request.

of small-size programs includes those related to the sub-functions related to Animal and Plant Defense, Rural Extension, Training of Human Resources, Information, Agroenergy, Normalization and Quality, to mention but a few. Together, these programs account for some 3.5% of the Agriculture Function expenditures. To give an idea of how inexpressive these programs are, in 2004 Rural Extension accounted for 4.7% of expenditures; when attributions were transferred to MDA, this program practically disappeared from the Agriculture Function.

Public expenditures incurred with trade and rural credit

Table 12 shows the highest figures for trade expenditures in 2009, of the last 5 years, and this result was caused by increased expenditures. Compared with 2008, both inventory formation and the guaranteeing of stable prices generated more expenditure.

Due to the low price of agricultural products in 2008, the government made high acquisitions in 2009 with the purpose of guaranteeing price and income for the producers. The need of a higher performance in 2009 increased the

growth of trade expenditures in that year. Other trade instruments, such as the options market, show that greater amounts of products were negotiated since 2000 (CONAB, 2010b).

In terms of rural credit, the increase of government expenditures occurred mainly due to Pronaf's expenditures and agricultural costs. Pronaf's expenditures increased from R\$ 1.15 billion to R\$ 1.68 billion, and agricultural costs increased from R\$ 513 million to R\$ 780 million.

In 2009, trade and rural credit expenditures together were responsible for government expenditure of R\$ 7.35 billion. This amount represents 0.23% of the GDP in 2009, which is a small amount compared to other economies, and places Brazil among the countries with the lowest rate of agriculture protection in the world.

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Table 12. Federal Government expenditures incurred with trade and rural credit^{(1),(2)}.

Trade	2005	2006	2007	2008	2009
Formation of public inventories (AGF)	1,378.4	1,063.1	734.1	656.8	2,840.4
Funding and equalization of the federal government's loan operations (EGF)	8.1	3.9	40.7	0.0	78.2
Funding and equalization of prices for acquisitions and inventory formation (AGF)	166.2	270.9	246.8	49.6	188.0
Guarantee of trading price maintenance	443.9	2,187.6	1,839.4	187.7	1,176.8
Subtotal	1,996.6	3,525.6	2,861.0	894.1	4,283.4
Rural credit	2005	2006	2007	2008	2009
Funding and equalization of interest rates for family agriculture (Pronaf)	2,157.4	1,776.0	1,636.6	1,145.9	1,681.2
Funding and equalization of interest rates for agricultural cost operations (Law no. 8.427/92)	247.2	406.4	1,139.8	512.9	779.7
Funding and equalization of interest rates for rural and agroindustrial investment operations	471.0	454.0	505.5	180.3	156.7
Equalization of interest rates and fulfillment of financial obligation bonus	51.4	40.7	37.3	34.1	7.9
Equalization of interest rates for the extension of rural credit debt (Law no. 9.866/99) – Pesa	364.1	234.6	245.0	241.9	248.7
Economic subvention concession to P-Nacional (Credit)	0.0	21.8	95.1	162.3	179.3
Subtotal	3,422.3	2,934.8	3,659.6	2,301.6	3,071.5
Total trade and rural credit	5,418.9	6,460.4	6,520.6	3,195.8	7,354.9
Total Agriculture Function expenditures	10,211.8	11,817.6	12,627.1	9,670.4	14,181.3

⁽¹⁾ In millions of reais in 2009. Amounts deflated by FGV's IGP-DI.

⁽²⁾ There may be so differences between data shown in the table and data provided by the General Coordination of Credit Operations of the National Treasury (Copec) in the internet. In general, figures provided by STN/Copec are lower due to the concept expenditure adopted for this study and that which is adopted by the Coordination. This study adopts the concept of expenditure incurred, whilst Copec adopts the concept of expenditure paid. The concept of expenditure incurred is more comprehensive and represents the government's expenditure incurred during the year and also part that will be eventually allocated for the next fiscal year.

Source: data provided by the Secretariat of National Treasury by request.

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The development of Brazilian agriculture and future challenges¹

Geraldo B. Martha Jr.²
Eliseu Alves³
Elisio Contini⁴
Simone Ramos⁵

Introduction

Over the last four decades, Brazilian agriculture has stepped up to the challenges posed by society. In the 1970s, the four major challenges posed on the sector were: 1) to ensure food supply at reasonable prices, especially for cities that were undergoing heavy migratory flow from the rural population⁶; 2) to foster the development of the interior of Brazil, generating jobs, income and welfare to the rural population; 3) to ensure the occupation of the Brazilian territory and to preserve the Brazilian base of natural resources ; 4) to create production surplus to export, generating financial resources to boost other sectors of the economy.

At that time, the primary objectives of Brazilian agricultural policies⁷, from the point of view of groups favored by society, were particularly challenging. According to Hayami and Godo (2004), countries with intermediate income level have a challenging agricultural policy, as on the one hand they must guarantee low prices for urban workers, and on the other they must prevent rural producers' level of income from decreasing.

For the future, the challenges for Brazilian agriculture are equally relevant. A macroeconomic environment with solid fundamentals that are transparent and predictable in key variables (inflation, exchange rate) is obviously one of the core aspects, as well as improvements and expansion in infrastructure (transport and storage) and increasing exports. These factors guarantee competitiveness to the sector in face of world competitors and enable the production potential of Brazilian agriculture to be fulfilled in face of the higher global and domestic demand for food, fibers and biofuels.

However, in a future perspective, just increasing production is not enough; the expansion of agricultural production should follow sustainability criteria that include technical-economic, social, and environmental dimensions. The priority action is to prevent the agricultural frontier from expanding via continuous gains in agricultural productivity, and to foster the substitution of low-productivity pastures with other more productive agricultural and forestry uses.

Criteria for technical-sanitary standards for agricultural production in Brazil are added to

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² Researcher, Embrapa Strategic Studies and Training. E-mail: geraldo.martha@embrapa.br

³ Researcher, Embrapa, and advisor to Embrapa's President. E-mail: eliseu.alves@embrapa.br

⁴ Researcher, Embrapa Strategic Studies and Training. E-mail: contini@embrapa.br

⁵ Agronomist, analyst for Embrapa Cerrados. E-mail: simone.ramos@cpac.embrapa.br

⁶ According to IBGE, the Brazilian population in 1960 was 70 million people, of which 45% were considered urban. In 1980, the population had increased to 119 million and 68% was urban. In the period from 1960 to 1980, the Gross Domestic Product (GDP) had an impressive yearly growth rate of 7.54%, which caused the demand for food to increase even more, especially by those that positively respond to income increase.

⁷ According to Mueller (2007), agricultural policies can be classified as: 1) quantitative policies, encompassing stimulus policies (market stimulus with minimum prices, subsidies, taxation, insurance, etc., and rural credit) and policies for specific products; 2) qualitative policies that focus on structural changes, such as land use, infrastructure and technological development.

these requirements. An example is the adoption of production technologies and systems that reduce greenhouse gas emissions, the so-called low-carbon agriculture, which is becoming stronger and should be a core point to consider in the next decade for the expansion of Brazilian exports to better paying markets. In effect, sustainability and good practice criteria for agricultural production should be taken seriously by the domestic production sector in order to solve any form of negative pressure posed on Brazilian exports, either in terms of loss of value or of export volume.

This article is structured in four sections, the first of which is this introduction. In the second section we explore some aspects of the development style of Brazilian agriculture over the last 40 years⁸. In section three, we focus on the determining factors of the production capacity of Brazilian agriculture. In the fourth and last section, we discuss the challenges and opportunities to consolidate a leading position for Brazilian agriculture in the global scenario.

The style of development of Brazilian agriculture

The development of Brazilian agriculture since the 1970s has been strongly based on the generation of science for the tropical environment and on the increased incorporation of technologies developed for the production process. These significant technological advancements brought a series of socioeconomic and environmental benefits for Brazil.

Expansion of food supply

Until the 1970s, a considerable share of food security⁹ in Brazil was guaranteed by imports. From the end of the 1960s, but especially

during the mid-1970s, structural changes were made to the Brazilian agricultural sector that in the following decades helped build Brazil's food self-sufficiency, except in the case of wheat. Brazilian entrepreneurs took on the challenge of producing with competitiveness in the agricultural frontier (Cerrado region). The availability of natural resources in the Cerrado region and the investments made by the federal government in basic infrastructure, in science and technology for tropical agriculture, and in agricultural policy instruments such as rural credit made it possible to incorporate modern technologies to production systems, thus determining a significant increase in food supply without the need to proportionally expand the agricultural area (Figure 1).

Food supply in Brazil increased at higher rates than (domestic and exports) demand, and for this reason food prices fell dramatically. Figure 2, adapted from Alves et al. (2008), shows the evolution of the balance between supply and demand over the last four decades. The demand for food grew significantly since 1975, going from D_{1975} to D_{2010} . The main factor that induced the shift from D_{1975} to D_{2010} was the growth of per capita income, especially in poorer countries and regions. Urban population growth was also an important factor that influenced the shift of the demand curve to the right.

If there had been no technological advancement during the period studied in Figure 2, the new equilibrium price would occur at point b, where curve S_{1975} crosses curve D_{2010} ; the consequently increase of prices would be provided by segment ab. Under this scenario, there would have been a large transfer of income from consumers to farmers. However, in the period 1975–2010, the green revolution spread and was consolidated throughout Brazil, and the technological development of tropical agriculture shifted the supply curve from S_{1975}

⁸ For further information about the evolution of the Brazilian agricultural sector read Contini et al. (2010) and Gasques et al. (2010).

⁹ According to the Food and Agriculture Organization of the United Nations (FAO) (2009), food security exists when all persons at all times have physical or economic access to food, that must be not only safe (free of toxic substances, contaminants, etc.) but should be quantitatively and nutritively adequate to meet dietary needs and preferences of the individuals to have an active and healthy life. Food security encompasses four dimensions: 1) availability: focuses on food production; 2) access: the ability of people obtaining food, from production, buying or transfer; 3) use: relevant issues address the nutritional value, the safe food and interaction with physiological conditions; 4) dietary system stability: supply and stable access to food with capacity to respond to food emergencies.

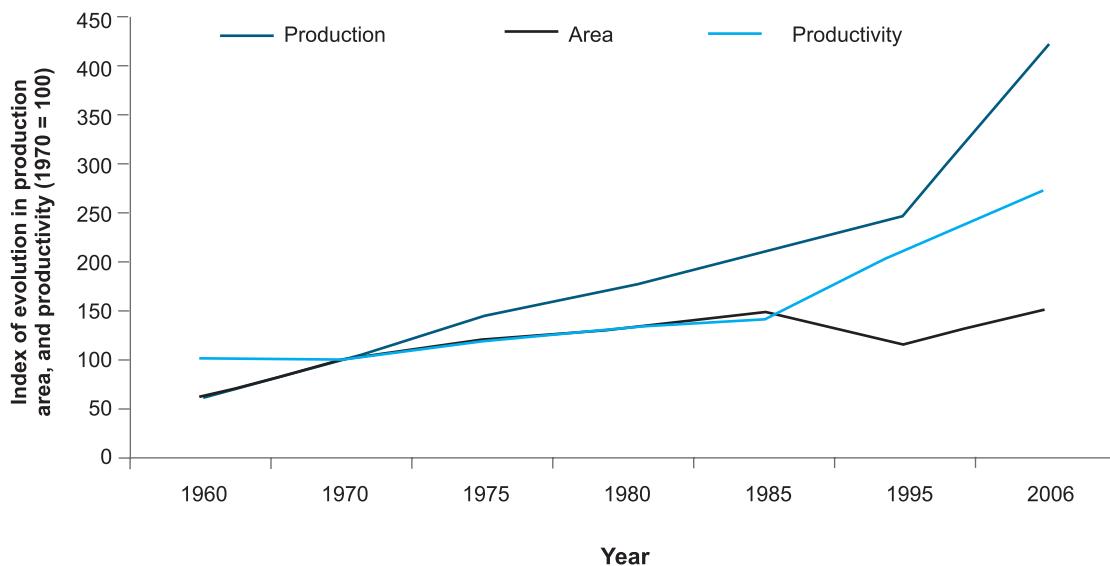


Figure 1. Evolution in production, area and productivity of the five major grain and oilseed crops (rice, beans, maize, soybean and wheat).

Source: data from IBGE's (2009), author's calculations.

to S_{2010} . In contrast with the initial equilibrium price in 1975 (point a), the decrease in price was equivalent to segment cd. If measured correctly, price reduction would be ba + cd.

Reduction in food price and income effect

Food production has increased at higher rates than food demand over time while food prices have decreased. Using historical data on food prices from Dieese, concerning a food basket for the city of São Paulo, Brazil, we found that the price of this food basket in April 2010 represented, in real terms, around 53% of the price paid by consumers in January 1975. In 35 years, food price to consumers has decreased by half, which greatly reflects the expansion of the agricultural production in Brazil. Even when the food price peaked in 2008, it had a very small impact on the prices paid by consumers (Figure 3).

The greater food supply that resulted from technological gains throughout the period, as well as the deregulation of markets in the 1990s, determined two very important effects to society. A very important one was a significant transfer

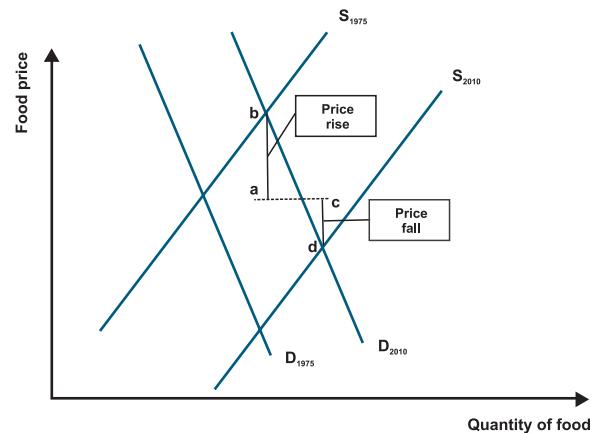


Figure 2. Dynamics of agricultural prices in Brazil for the period 1975–2010.

Source: adapted from Alves et al. (2008).

of income from farmers to consumers, as shown in Figure 4.

Under this scenario of supply growing at faster rates compared to demand, consumers benefit because they can either buy the original quantity of food (Q_0) at lower prices (P_M instead of P_0) or increase their food consumption to a higher level Q_d (Figure 4). The net welfare gain for consumers is equivalent to the $abfc$ area,

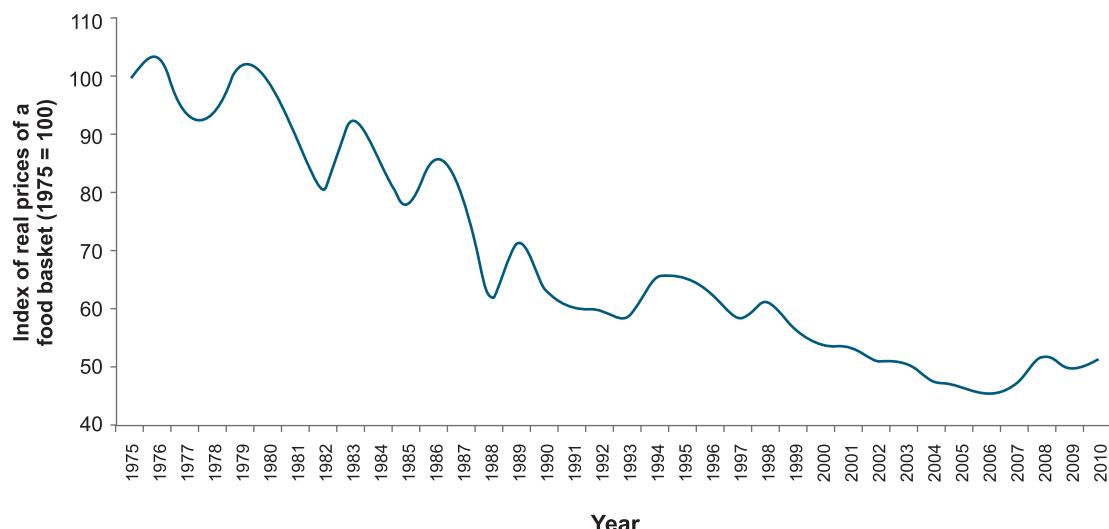


Figure 3. Real price index for a food basket in the city of São Paulo, January 1975–April 2010.

Source: data from Dieese (2010), author's calculations.

which represents the increase in consumer surplus resulting from the decrease in food prices.

Gains in consumer surplus took place partially due to lower income for Brazilian farmers. Initially, farmers' gross income is shown in area $abjg$; assuming that the supply curve measures marginal costs, the cost for producers is shown in the area under the supply curve (bjh), and producers' surplus (net income) is equal to the difference, $abhg$. When food price falls from P_0

to P_M , farmers' net income is reduced from $abdc$ to $cdhg$. This loss in producer surplus – $abdc$ – represents the contribution (income transfer) from farmers to consumers. Barros (2006) estimated that in the decade that followed the Real Plan, this transfer might have exceeded R\$ 1 trillion. According to the author, income transfer from the rural area to consumers seems to have stabilized at around R\$ 150 billion annually.

Another very important effect resulting from lower food prices is the so-called income effect that increases purchasing power, especially of the poor, who spend a greater portion of their income to buy food. When food prices decrease and remain stable, as in the case of Brazil, a larger share of income is allocated to buy non-food items, boosting other sectors in the economy.

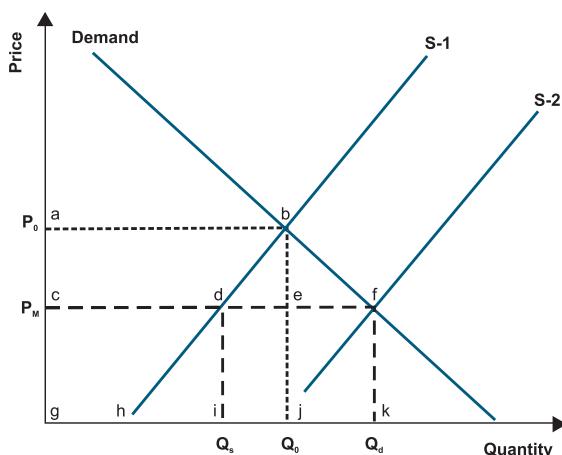


Figure 4. Effect of increased food supply (from $S-1$ to $S-2$) and decreased food price (from P_0 to P_M) on producer and consumer surpluses.

Source: adapted from Timmer (1986).

Labor, income and welfare generation in rural areas

Despite the fact that agribusiness might still have an outstanding position in the economy of a more developed country, the relative economic importance of the agricultural sector decreases vis-à-vis the industrial and service sectors. The gradual reduction of the agricultural sector's share in the composition of the GDP and

of the labor force in Brazil is unavoidable (Table 1). Notwithstanding, agriculture in Brazil is still an important sector for labor and income generation. Recent estimates made by Nassif et al. (2008), using the New Model for Labor Generation of the Brazilian Development Bank (BNDES), show that in 2007, for a R\$ 10 million increase in agricultural production, a potential of 1,054 job openings was generated (440 via direct effect, 169 via indirect effect and 445 via income effect).

The most dynamic agricultural regions were capable of generating more income and welfare in rural areas. For example, in 2004, the highest GDP per capita in dynamic agricultural microregions in the Brazilian Cerrado was in Parecis (R\$ 28,756.00), in Mato Grosso, with per capita GDP almost 13 times higher than the Jalapão microregion (R\$ 2,218.70) in Tocantins (MUELLER; MARTHA JÚNIOR, 2008).

The Human Development Index (HDI) is a more comprehensive development indicator. It was created in response to the frequent criticism on the use of GDP per capita, or per capita income, as a development indicator. The assumption is that to measure the socioeconomic progress of the population of a given country or region, it is not enough to take only the economic dimension into account; it is necessary to further take into account other social characteristics such as education and life expectancy, which together better translate the quality of life of the population.

In a recent assessment, Mueller and Martha Júnior (2008) identified that the expansion of agriculture in dynamic agricultural regions in the Cerrado seems to have been an important factor to obtain improved HDIs. Taking the 0.766 value for Brazil's HDI in 2000, and the 10.1% growth rate

Table 1. Brazil's gross domestic product (GDP) and per capita GDP adjusted by the purchasing power parity (PPP), and share of different sectors in the GDP and in the composition of labor force.

Brazil	GDP – PPP (US\$ billion)	GDP/capita – PPP (US\$ 1,000)	% GDP			% labor force		
			Agric.	Ind.	Serv.	Agric.	Ind.	Serv.
World	65,960.00	9,990.57	4.0	32.0	64.0	40.7	20.5	38.8
Mozambique	29.17	1,395.32	21.1	30.9	48.0	81.0	6.0	13.0
Nigeria	191.40	1,417.45	17.3	53.2	29.5	70.0	10.0	20.0
Brazil	1,655.00	8,710.04	8.0	38.0	54.0	20.0	14.0	66.0
Russia	1,746.00	12,349.89	5.3	36.6	58.2	10.8	29.1	60.1
India	4,164.00	3,685.39	19.9	19.3	60.7	60.0	12.0	28.0
China	10,210.0	7,724.01	11.9	48.1	40.0	45.0	24.0	31.0
Chile	202.70	12,447.24	5.9	49.3	44.7	13.6	23.4	63.0
Mexico	1,149.00	10,570.29	3.9	25.7	70.5	18.0	24.0	58.0
South Africa	587.50	13,352.93	2.6	30.3	67.1	30.0	25.0	45.0
Indonesia	948.30	4,040.58	13.1	46.0	41.0	43.3	18.0	38.7
United States	13,060.00	43,368.54	0.9	20.4	78.6	0.7	22.9	76.4
Japan	4,218.00	33,099.62	1.6	25.3	73.1	4.6	27.8	67.7
France	1,902.00	29,852.19	2.2	20.6	77.2	4.1	24.4	71.5
Germany	2,632.00	31,941.36	0.9	29.1	70.0	2.8	33.4	63.8

Source: CIA (2007).

from 1991 to 2000, the authors verified that the performance for every region within the dynamic agricultural region in the Cerrado was highly favorable. In fact, the HDI of 22 out of 41 microregions assessed was above the national index average, while the HDIs of other eight microregions located below the national average were very close to it. Furthermore, HDI increase rates between 1991 and 2000 for most microregions were higher (in average, 15%) than the 10.1% for Brazil. Lower average rates were concentrated in micro regions that already had higher HDIs in 1991, such as the *Triângulo Mineiro*. Mueller and Martha Júnior (2008) noted that with economic growth, actions to improve education and services that lead to positive effects in health are obvious in poorer regions.

Expansion of exports

Exports of agricultural products such as sugar, cotton and coffee have historically had outstanding importance for the Brazilian economy. In the last decade, however, the diversifica-

tion and dynamism of international trade were outstanding. In 1965, 52.5% of Brazilian exports were based on a single product – coffee – and agribusiness exports accounted for 84.4% of Brazil's total exports (RODRIGUES, 2008). In 2009, Brazilian exports totaled US\$ 64.76 billion and represented 42.5% of total exports. The agribusiness export in the last decade is shown in Table 2; it reflects a higher participation of soybean, meat, the sugar-ethanol complex, and the forestry sector.

Until the mid-1990s, Brazilian agriculture strongly responded to the stimulus of the domestic market. However, over the last 15 years a growing share of Brazilian agricultural products was exported. This expressive surplus for exports has guaranteed positive results for the Brazilian trade of balance, supported food prices in the domestic market, and from a global perspective, reflected an important contribution from Brazil to reduce world hunger and macroeconomic (inflationary) pressures.

Table 2. Composition of Brazilian agribusiness exports.

Main exports (products)	1999		2009		Variation in quantity (%)
	Quantity (US\$)	Share (%)	Quantity (US\$)	Share (%)	
Soybean complex	3,760,985,495	18.4	17,239,708,452	26.6	16.45
Meat	1,941,805,477	9.5	11,787,226,918	18.2	19.76
Sugar-ethanol complex	1,976,541,316	9.6	9,715,970,941	15.0	17.26
Forestry products	3,855,472,900	18.8	7,222,871,949	11.2	6.48
Coffee	2,463,875,421	12	4,278,940,375	6.6	5.67
Tobacco and byproducts	961,237,046	4.7	3,046,032,052	4.7	12.23
Leather, leather byproducts and furs	1,781,357,173	8.7	2,041,065,835	3.2	1.37
Cereals, flours and powders	65,377,111	0.3	1,818,558,831	2.8	39.45
Fruit juices	1,290,054,652	6.3	1,751,827,613	2.7	3.11
Fiber and textile products	673,464,336	3.3	1,260,339,975	1.9	6.47
Other products	1,723,833,825	8.4	4,593,088,278	7.1	10.30
Total	20,494,004,752	100.0	64,755,631,219	100.0	12.19

Source: Agrostat (BRASIL, 2010a).

Preservation of the natural resource base: the example of the land-saving effect

Brazil is nowadays an agricultural power that has been expanding and consolidating its agriculture with a moderate level of biome anthropization. For example, according to Project Probio (PROJETO..., 2007; BRASIL, 2007), coordinated by the Ministry of Environment (MMA), anthropization in the Amazon and in the Cerrado regions in 2002 was of only 9.50% and 38.98% of the area of each biome, respectively. These data are continuously updated and improved. Recent estimates for 2008 pointed out that the Cerrado region, for example, had 51% of its area preserved with original vegetation (VIANA, 2010).

These moderate levels of anthropization reflected the development of technologies for agricultural production in the tropical environment. This style of growth in the Brazilian agriculture, based on productivity gains, has enabled a significant land-saving effect. Calculations made by the Brazilian Agricultural Research Corporation (Embrapa), identified in Table 3, show that because of productivity gains in Brazilian agriculture over the last 35 years, the area that has been spared exceeded 250 million hectares. This certainly is an important contribution from agriculture to environmental sustainability.

Determinant factors of the production capacity of the Brazilian agricultural sector

The production capacity of Brazilian agriculture has greatly evolved over the last four decades. Figure 5 shows the evolution in the per capita production of rice, beans, maize and soybeans. In 1970, the per capita production of products that are inelastic to prices and income, such as rice and beans, was 172 kg and 50 kg, respectively. In 2006, these figures increased to 301 kg in the case of rice, and 101 kg in the case of beans. For products that are more elastic to prices and income (and that have their de-

Table 3. Spared area of Brazilian agriculture, in 1,000 ha.

Product	Current area	Δ factor	Projected area	Saving
Whole cottonseed	1,077	8.3814	9,030	7,953
Paddy rice	2,875	2.7685	7,959	5,084
Coffee	2,216	2.0049	4,443	2,227
Sugarcane	8,141	1.7243	14,038	5,897
Beans	3,993	1.3895	5,548	1,555
Corn	14,766	2.7545	40,673	25,907
Pasture	158,753	2.0760	329,571	170,818
Soybeans	21,313	2.4618	52,468	31,155
Wheat	1,852	2.2737	4,211	2,359
Other seven crops	1,430		2,829	1,399
Total	216,416		470,770	254,354

Source: data from IBGE (2009), calculation by A. Cavalcanti and E. Alves.

mand sustained by increased demand for animal protein), such as maize and soybean, per capita production had an even higher increase: maize, from 417 kg in 1970 to 1,380 kg in 2006; and soybean, from 62 kg in 1970 to 1,329 kg in 2006. A significant share of soybean and maize production, around 60% and 85% of the total, respectively, remain in the domestic market, where a large portion is used in swine and poultry production (BRASIL, 2010b).

However, Brazilian agriculture did not only supply the domestic market. Growing shares of agricultural products are being exported (Table 2), thus helping strengthen Brazil's role in the world food market. In fact, in 1995, Brazil accounted for 5% of the world trade; in 2008, this rate increased to a significant 8%. Only the United States, with 18% of food exports in 2008 (compared to 23% in 1995), has individually greater relevance in world agricultural markets than Brazil (LIAPIS, 2010).

In order to keep Brazilian agriculture in this path of success, a series of challenges must

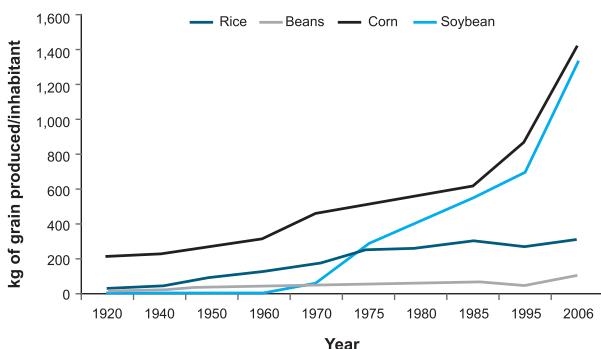


Figure 5. Evolution of per capita production (kg/inhabitant/year) of rice, beans, soybean, and corn.

Source: adapted from IBGE (2010).

be overcome. Some are related to the production capacity of agriculture. To address the production potential of agriculture, three important determining factors should be noted: human capital, technology generation and diffusion, and natural resources and weather.

Human capital

A considerable portion of the success of Brazilian agriculture over the last decades reflects the use of science-based knowledge and technology. The transfer of knowledge and technology occurs via a research system that carries out the required adaptations for a certain region (ALVES, 1985). This agricultural development strategy is further reinforced considering necessary future outcomes, keeping in mind the need to increase land and labor productivity in a possibly different and uncertain environment due to climate change.

However, knowledge and technology have little chances of being successfully adopted and used in large-scale in science-based production systems if minimum reading and math skills are limiting (RODRÍGUEZ et al., 2008). For example, at the operational level, how can the amount of fertilizer or seeds be adequately sized and how can the seed spreader be adjusted without minimum knowledge of math and if the service manual cannot be read? At a higher training level focusing on the decision-making process, basic theoretical knowledge and even-

tually the use of scientific methods are required (RODRÍGUEZ et al., 2008) to depart from the generally-accepted “rule of thumb” and to make the required adaptations in the production system.

A higher level of continuous education and training, both at basic and advanced levels, is required for better market placement, for an improved ability to make decisions, such as the perception of the opportunity cost, and lastly, for the perception of overall opportunities and risks. Thus, innovation in a firm depends on qualified human capital. Furthermore, with higher levels of education and with the strengthening of competences, gains in labor productivity increase, which in turn further boost average wages and income.

Technology generation and dissemination

In a science-based era, the generation of technologies is obviously an essential stage. Brazilian agricultural research has yielded high economic returns to society, totaling around 40% of internal rate of return (ÁVILA et al., 2010). In spite of this highly favorable economic result, investments are high and it takes a long time to repay them: usually 15–20 years depending on the technology. Then, the partnership between public and private research can help increase investments made in research, thus expanding the universe of knowledge and technologies available to farmers (ALVES, 2008).

Some key technologies that should eventually be funded are new plant varieties (adapted to non-native ecosystems, bred for higher productivity for a given environmental condition, resistance/tolerance to biotic and abiotic stress, and incorporating new tools such as biotechnology and nanotechnology); new inputs (machinery and equipment, fertilizers and agrochemicals); and new agricultural practices and innovative production systems, to accommodate more production cycles in a given year (two crop seasons per year), for instance, or to provide greater efficiency in water and nutrient use efficiency.

Another important focus is to increase or, depending on specific conditions, to maintain productivity gains that will enable the expansion of agricultural production, without the need to proportionally increase the area. In this context, an interesting parameter to assess the possibility of expanding agriculture, preferably via productivity and not through an increase in cultivated area, is the ratio between current (average and best producers) and potential productivity. For example, the average productivity of soybean currently is 3 t/ha. Top producers have been yielding average productivities of 4 t/ha; research results considering environmental limitations and the best technology available already showed a 6–7 t/ha potential. Hence, there still is room for growth before a yield ceiling is reached, as the yield gap between average and top producers is 43%–50% and 57%–67% of the productivity potential, respectively. Naturally, it is expected that under certain environmental and physiological limits, research can further increase these potential yields in the future, preventing farmers from reaching a theoretical roof in which additional food production can be obtained only through an expansion in agricultural area. In addition, some high-yielding technologies already available depend on higher relative prices for their large-scale adoption by farmers.

Obviously, after technology has been generated, it must be assessed with rigor and then be effectively disseminated. Alves (2001) proposed the following steps to assess agricultural technologies: a) provide a detailed description of the technology or knowledge; b) determine which technology will be replaced, clarifying the advantages and disadvantages of the new technology compared to the one currently in use in farms; c) detail the systems where the new technology can be applied and the need for (and the extent of) changes/adaptations in the current system; d) inform the costs of production of the new technology compared to the one in use which this new technology is supposed to replace, including price and climate risks; e) inform the new technology's potential

response to modern inputs; f) inform if there are restrictions for adopting the new technology in terms of capital acquisition costs, education/training of the farmer, knowledge about technical service and credit limitations; g) identify the environmental impact of the new technology; h) when applicable, separate private from social costs and benefits.

From the viewpoint of capacity building and strengthening, it should be remembered that the low bio-economic performance of the production system may not be only due to farmers' limited use of technical assistance. In some cases, the difficulties that research and rural extension have in transferring the existing knowledge and recommendations into a language that can be understood by producers are also an important factor leading to unsatisfactory performance (MARTHA JÚNIOR; VILELA, 2007).

Natural resources and weather conditions

Agricultural production capacity depends on the availability of natural resources, on weather conditions (intensity and pattern of variation), and on the possibility of making changes in the production environment through the use of modern technologies. Relevant variables to be analyzed, which vary from region to region are: land availability; topography; soil fertility (in chemical, physical and biological terms) and soil texture; water availability and retention in soils; quantity and distribution of rains; temperature (intensity and variation); and light (intensity, variation, and photoperiod).

Thus, natural resources and weather conditions dictate what, where and when crops and pastures can be grown using a given technological package and considering some political and economic conditions. Here are some examples. Sugarcane finds favorable natural resource availability and weather conditions to express high yields in the Southeast and in some parts of the Cerrado but not in the Amazon biome; for this reason, over 90% of the expansion of sugarcane crops in the next decades will be concentrated in the western part of São Paulo and

in the parts of the Cerrado that border this state. Soybean, in Mato Grosso, is competitive with other regions in Brazil and worldwide due to its high productivity levels and its lower costs of production. Thus, productivity reflects the availability of natural resources, weather conditions and the technologies adopted by farmers. Due to inherent characteristics of crops and pastures, in every area where a high-productivity crop (grains, oilseeds or fibers) can be grown, it is possible to implement integrated crop-livestock systems; however, these mixed crop-livestock systems cannot be efficiently implemented in every area where livestock is raised.

Favorable and unfavorable conditions for agricultural production

Given the availability of human capital, technology, natural resources and weather, some conditions can favor agricultural production capacity, both in terms of intensity and of timely response in supply. A good example are economic issues (supply and demand of agricultural products in the domestic and world market under different timeframes) and policies (macroeconomic, agricultural – incentives for rural producers, such as rural credit with competitive interest rates compared to international competitors, instruments for stabilizing farmers' income, risk management instruments, payment for environmental services –, or industrial policies with focus on agricultural inputs).

On the other hand, there are some conditions that can have negative effects as they could control or restrict agricultural production capacity. Some examples are: infrastructure (distribution and transport of agricultural products from the farm to the market and then to consumers, communication and information technology); legal aspects (labor legislation that can influence the competitiveness among activities and can possibly influence land use decisions, and environmental issues, such as agroecological and economic zoning, legal reserve and permanent areas of preservation regulations); economic issues (interest rates, taxation); and administrative efficiency (bureaucracy, exporting difficulties).

Addressing these conditions in detail is not the intention of this article; however, some examples can help illustrate the meaning and importance of those factors to boost or restrict agricultural production capacity over the next decades. One ought to consider initially positive factors, such as rural credit and competitive interest rates compared to international competitors.

The support given to the producer via agricultural policies is justified by the fact that agricultural markets combine uncommon characteristics that greatly affect supply and demand. In terms of demand, low own-price elasticity and low income elasticity are verified. In the short-term supply, a high dependence on weather conditions is observed; in the long-term, agricultural supply depends on technological innovations. In addition, there is the perfect competition nature of agricultural markets, which renders them unprotected against the acquisition of inputs in oligopsonic markets and the selling of products in oligopolized markets. Furthermore, the benefits reaped from investments made in Brazilian agriculture, as presented in the previous section, were not restricted to the sector, but rather, were largely transferred to society with positive effects over other sectors of economy.

Many investments in agriculture have positive economic results when international interest rates are used. The specificities of Brazilian macroeconomy, however, may turn the investment into a less attractive option compared to investments in the financial market. In other situations, even with the high interest rates practiced in Brazil, investments in agriculture are a viable option. However, negative cash flows at the start of a project (intensity and years of duration), which are incompatible with farmers' repayment capacity, entail giving up the investment or, in other cases, a less costly (but also less efficient) technology.

Thus, the availability of adequate funding in terms of volume of credit, period to repay the loan and competitive interest rates, from a social perspective, enables the expansion of food supply

at more reasonable equilibrium prices. From the producer's viewpoint, adequate funding makes it possible for the benefit generated by technology to be accomplished at longer deadlines, increasing the opportunities for large-scale adoption of the technology and can eventually make it more inclusive as it can be adopted by producers with less capital. This situation is strengthened by the fact that when interest rates are more competitive, the risk premium for a given internal rate of return is higher, which may eventually boost the intensity and promptness of the supply response.

Let us consider a negative condition, such as taxation. The taxation of an economic activity is the launching pad for the very existence of the government, as it is a necessary source of resources so that the government can perform its role in society (Timmer, 1986). Extremely high taxation, however, ends up undermining the competitiveness of the productive sector and the welfare of the population.

As in any other economic activity, agriculture is influenced by the incidence of taxes. A study carried out by Fiesp/FGV-SP (2009) showed that agricultural commodities' price had an average 12% taxation. Specifically in the case of beef, sugarcane, soybean and maize, the fiscal burden identified in that study was of 15.56%, 10.45%, 8.04%, and 2.50%, respectively. It should be noted that as these products have different demand and supply elasticities (Negri Neto; Coelho, 1993), the percentage of tax accrued by producers and consumers will have a very different behavior. If the absolute value for own-price elasticity of demand is higher than supply elasticity, such as in the case for beef and chicken, then the farmer will bear a higher percentage of taxes. Likewise, when own-price elasticity is less elastic than supply elasticity, as the case of rice and coffee, the highest share of taxes will be borne by consumers.

In a future perspective, it is important to quantify the impact of these taxes considering different agricultural products, by regions, and to assess how productivity affects the impact of taxes in costs of production and competi-

tiveness vis-à-vis other land-use alternatives. If tax burden positively responds to productivity increases, this can indicate that more efficient farmers might be progressively hindered by the agricultural tax system. Given the importance of the agricultural sector to Brazilian economy and that on average 22% of the population's income is spent with food items, research in this area can positively contribute to the decision-making process of public and private agents. And from a regional policy perspective, the impacts of agricultural fiscal policy can also vary depending on inherent regional characteristics (land-use, industrial activity).

Final considerations

In the next decades, Brazil will be strongly positioned as one of the great players in the production of food, fibers and bioenergy. Recent projections of the Organization for Economic Cooperation and Development (OECD) and the Food and Agriculture Organization (FAO) (OECD; FAO, 2010) report on agriculture for the next decade (Figure 6) have shown that in the period 2009–2019 the growth in Brazilian agribusiness should be 38%, twice the world average and higher than the growth projected for other important food producers: United States, Canada and Australia, around 10%; European Union, 4%; China and India, approximately 22%; and Russia and Ukraine, around 27%. These figures reflect vigorous growth rates for agricultural production in countries like Brazil (2.8% annually), Ukraine (2.3% annually) and Russia (2.1% annually) compared with traditional producers, such as the European Union (0.4% annually), Canada (0.8% annually) and the United States (1.0% annually). Australia, India and China would have intermediate annual growth rates 1.1%–1.7%.

The role of agriculture in fostering development and as an effective tool to guarantee food and energy security requires a systemic approach, adequate investments and coordinated efforts, that are often carried out by agents that

have conflicting opinions about a given matter, to find sound solutions to the different challenges in the economic, social and environmental dimensions (MUELLER; MARTHA JÚNIOR, 2008). In the coming decades, although food production is still the main focus, the production process shall consider additional issues. Brazilian and world societies are becoming more and more concerned and demanding that other issues, such as environmental, food quality and safety issues, are included in the “production function.”

The environmental dimension, including the use of biofuels, is getting stronger and bringing about new perspectives to the production model. For example, consider direct and indirect land use effects from biofuel production expansion vis-à-vis deforestation and the adoption of novelty low-carbon agricultural technologies. These variables must be incorporated into the usual technical and economic restrictions of the production function. It should be mentioned that the style of growth of the Brazilian agriculture

has historically been based in land-saving technologies (Figure 1, Table 3), reflecting persistent productivity gains (GASQUES et al., 2010).

Recently, agricultural policies already indicate, via incentives, the importance of expanding the use of low carbon technologies. In the 2010–2011 Agricultural and Livestock Plan, of the Ministry of Agriculture, Livestock and Food Supply, the Low Carbon Agriculture (ABC) credit line has R\$ 3 billion, with annual interest rates of 5.5%. In accordance with the Climate Change Law that was approved in December 2009, it is estimated that the agricultural sector (recovery of low-productive pastures, and stimulus to increase the adoption of integrated crop-livestock systems, use of biological nitrogen fixation and high-quality no-till planting) and the biofuel production will be able to reduce the greenhouse gas emissions from the baseline scenario by 226 Mt of CO₂-equivalent by 2020. This implies that the agricultural sector alone may be responsible for 21.5% of the mitigation actions proposed by the Brazilian government.

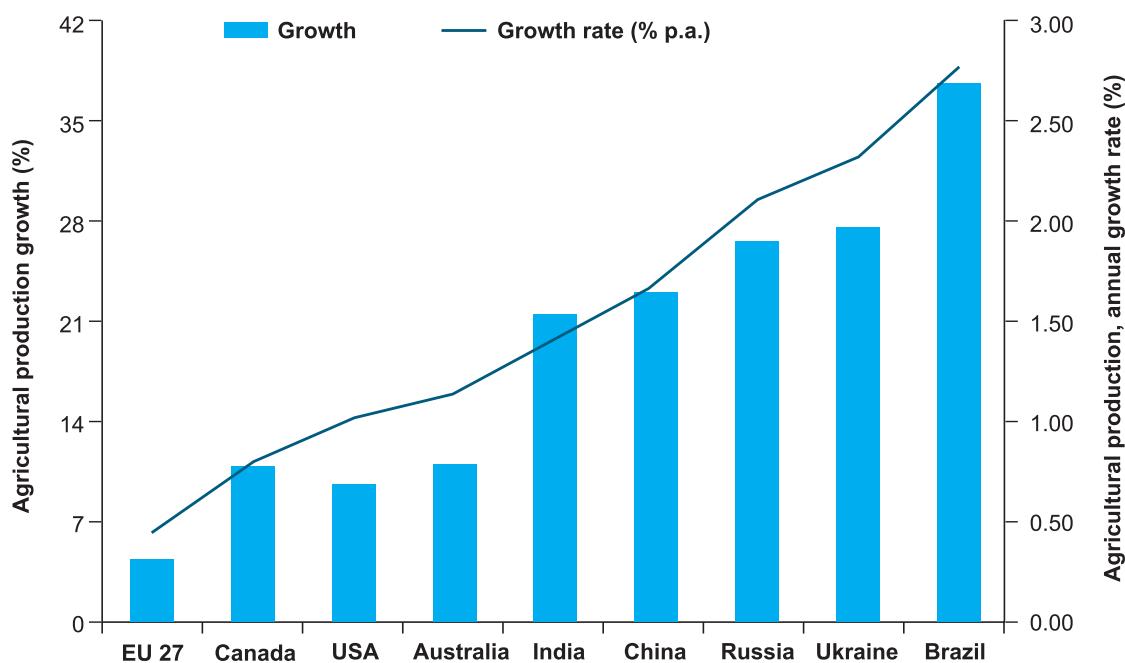


Figure 6. Agricultural production growth in selected countries and in the European Union (EU-27).

Source: OECD; FAO (2010).

However, the contribution of the agricultural sector may be even larger because of possible indirect spillovers arising from productivity gains and consequent land-saving effects. This may be a win-win situation because there are benefits under both socio-economic and environmental perspectives. On the one hand, the supply of food, fibers and bioenergy would be increased without new deforestation and, on the other hand, low productivity agricultural areas would be replaced by agricultural alternatives using modern and more efficient technologies. Clearly, catalyzing research-generated innovations implies ultimately in their adoption by farmers, which requires dynamic and well-trained private and public technical assistance. In such a scenario, the agricultural sector may indirectly contribute with an additional mitigation of 669 Mt of CO₂-equivalent by 2020 compared to the baseline scenario because of the avoided deforestation.

Meeting those requirements (and including social issues) that are growingly more demanding and that may determine the opening or restriction to markets that pay a better price for quality agricultural products will depend on the incorporation of modern technologies, which as a rule are more capital-intensive. However, the most severe restriction to boost the production capacity of the agricultural sector is human capital, in that it requires time to be removed. Capital restrictions embodied by the new technology are an outstanding deficiency, but they can be solved by a competent credit policy, while the access to more complex machinery and equipment can be solved by amending the renting and leasing legislation (ALVES, 2008).

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A half-century of transformations in the Brazilian rural scenario and the governmental action

Zander Navarro¹

Abstract – The purpose of this article is to associate the history of land in contemporary Brazil to government action, especially in relation to the most recent challenges when implementing its policies. The interpretation of Brazilian agrarian history is presented addressing the last fifty years, which is divided in five phases of ever-growing complexity. The first section highlights the crucial role of the modernization drive of the 1970s, a historical period when a new form of sociability became ingrained. Thereafter, the article presents some of the most notable changes in recent years, and calls attention to economic and productive aspects, although equally stressing the growing politicization of current debates about the future of rural Brazil. The last section summarizes some of the challenges considered urgent, which are confronting Brazilian agriculture in these times. In the conclusion, the article argues the need to discuss and implement a consistent strategy for rural development in Brazil, a government action which still does not exist.

Keywords: rural governance challenges, Brazilian agrarian development, contemporary Brazilian agrarian history, capitalist sociability.

Introduction

This article presents a brief overview of the Brazilian rural scenario and the changes it underwent over almost half a century. It is a sociological rather than multidisciplinary interpretation of a social and productive space of the Brazilian society that in a not so distant future was occupied by the majority of the Brazilian population, whether as their homestead or the place where rural practices were predominantly carried out. Another study points out that,

[...] in 1930, three out of four Brazilians lived in rural areas. By the end of the century, about one out of six remained in the same situation. (BUAINAIN; DEDECCA, 2010, in press).

It is a known fact that was only in a historically recent year – 1956 – that the contribution of industrial activities in the formation of domestic wealth exceeded the agricultural activity, showing that urbanization and industrial expansion processes are relatively recent, despite having gained momentum during the

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¹ Associate professor at the Department of Sociology of the Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, RS, and visiting researcher at the Institute of Development Studies (IDS), England. Currently assigned to the Strategic Management Advisory Office at the Ministry of Agriculture, Livestock and Food Supply (AGE/Mapa). E-mail: z.navarro@agricultura.gov.br

second-half of the last century. This is the reason why different cultural and social behavior aspects still significantly affect the rural Brazil of not so long ago, despite the relative urban-industrial abundance and the Country's technological importance.

During the 1970s, the Central-South, one of the most important Brazilian agricultural regions was greatly undergoing a remarkable technological revolution. A new rationality about the rural environment and its activities was imparted gradually under a strong process of economic-productive transformations, which would determine equally gradually but continuous changes on the social behavior of rural families from then on. That decade of economic transformations that changed both rural Brazil and the domestic economy as a whole is, for sure, the most outstanding decade of our history. As a consequence, when that period was over, the 1980s would find a radically different country, much more urbanized and first and foremost, highly guided by an economic logic (and its social repercussions) that would increasingly and decisively affirm capitalist sociability in Brazil.

The intention of this brief essay is to systemize recent agrarian history and its main features, highlighting its relationship with governmental action, whereby the potential role of the Ministry of Agriculture, Livestock and Food Supply stands out. The first and longest section summarizes the history of Brazilian agriculture, as perceived by the author, from the 1950s until present time. The first (and brief) overview of the Brazilian rural scenario for the period at hand shows there was a simple segmentation, where agrarian development can be simply divided in two periods: before and after the modernization that took place in the 1970s.² However, this section proposes a more nuanced period-division limited to the five phases of agriculture since the 1950s.

²Despite not addressed in this article, it should be noted that we have not yet consolidated a debate that identifies the differences that are not mere theories, but the expression of usually qualify the term "development." Synonyms such as agrarian development and rural development are used when their meaning is almost the opposite. If this discussion were made many differences of opinion related to the rural environment would probably be clarified. For an introduction to such differences, see Navarro (2001).

The second section addresses some recent and significant changes and their implications to the Government, highlighting in particular the fact that governmental action imperatives were greatly changed over the last two decades. This section draws attention, for example, to the unprecedented growing political awareness between relationships involving different rural stakeholder groups, gaining ground especially when Brazilian society underwent a strong democratization process during the post-Constituent period.

Finally, the last section of this article presents a schematic list of some of the most urgent challenges to be overcome in order to integrate the Brazilian rural scenario socially and economically, reaching more consistent levels taking into account an actually capitalist modernity. This section ends with an admonishing as part of the main conclusion: Brazil needs a rural development policy, which in fact, we never had in our whole history. One of the most important features of such policy, should it ever be implemented, will be to realize that government action assumptions have radically changed.

In the past, this action was earmarked exclusively for producers (or just some of them) and agricultural activities as such, as if they were a stand-alone product, disconnected from the rest of society and economy. Currently, Government action – that is a top priority for Brazil – requires a more comprehensive and total vision that reaches out beyond the rural scope and that implies in the existence of innovative governance, under a political-institutional format unlike the traditional model in effect so far (CHESHIRE et al., 2007).

Thus, current government policies require that history and its contemporary consequences can be interpreted, integrating other social and economic sectors and overcoming misleading influent existing perspectives. They can be lim-

ited visions that address just the land, or visions that address just agriculture defended by some analysts. In other words, it is necessary to build a new rural development policy that equally reinterprets agrarian history if the purpose is to produce better results in terms of production and productivity; however, it is equally important to maximize economic and social results not just for the rural scenario, but extended to all Brazilians.

The concise history of Brazilian agriculture: from post-war to present day

Proposing interpretations about agrarian development, highlighting in particular the periods when it effectively underwent changes (ergo, the main phases), will always be a controversial endeavor – especially since that those interpretations are proposed under the approach of social science, which is a scientific field where theoretical disagreement still thrives. Hence, the form of assessment will always be subject to criticism by opposing analysts. For sure this is no different in the case of Brazil, in much less so under this study.

In making this acknowledgement – the intention of which is to highlight the preliminary aspect of this study, since discussions about “decisive moments” in the Brazilian agrarian development are still rare – this author believes that maybe it is possible to perceive that the rural scenario and its production activities underwent five relatively distinct periods follow the end of WWII. In each period, the agricultural and rural dynamics was transformed by new processes, especially economic ones, driven by the logic inherent to agriculture itself, or most commonly, exogenous forces strong enough to charter a different path to the intelligibility of the development of agricultural activities. Likewise, and especially over the last years, political and

institutional processes started to make a difference in each of the five periods mentioned as follows: i) post-war until 1968; ii) from 1968 to 1981; iii) during the 1980s; iv) during the 1990s; v) from 1998–1999 to present day.

The starting point for the first period, albeit somewhat vague in terms of beginning, is hereby indicated as the “post-war” period, culminating in the period 1965–1967, when the National Rural Credit System and other complementary institutional schemes were implemented, which would later greatly boost the next period.

During the first phase, agriculture underwent visible technological primitivism, and production increase took place exclusively due to the increase of the planted area. Agroindustrial inputs were rarely used, as shown in the 1960 Census, which identified that there were only 56,000 tractors in place, all of which were imported. In sum, until those years, Brazilian agriculture was a virtually prehistoric activity from the technological outlook.

In those years of this first phase, there was no development of significant social behaviors that would motivate producers by a capitalist economic logic *per se*, where a principle of capital accumulation basically prevailed, especially due to contractual conditions and because the formalization of agricultural activities practically did not exist³. The coffee culture reigned absolute, as coffee was practically the only significant product of all the export agenda that was comprised mostly of agricultural products. In that period Brazil was primarily an agricultural and agrarian country, despite the rise of the Brazilian industrial sector, especially in the 1950s.

The social organization of producers was then embrionary, as just the largest land owners formed their associations to defend their own interests (and were accepted by the political system). Other producers, particularly poorer ones and rural workers, ran into nearly insurmountable difficulties to form their own organization,

³Classic interpretation that explains production primitivism in rural areas, at the same time when the roots of modern capitalism were set up in cities is the article by Oliveira (1972).

and it was only in the early 1960s that rural worker unions were able to expand with any significance (especially in the administration of Almino Afonso, in the Ministry of Labor, during the brief Administration of President Jango – João Goulart). In 1959, for example, there were only three authorized and/or acknowledged STRs in Brazil.

This social, economic, technological and political-institutional primitivism would start to be broken in the period of the military regime implemented in 1964, but was intensified only as of 1968, when the second phase of the Brazilian agrarian development began. Those were years of notable economic expansion, illustrated by 8.9% annual average economy growth during the 1970s, and for the first time the Brazilian Government was to implement a bold national strategy for technological modernization of agricultural activities. This phase encompasses the period 1968–1981, unprecedented in terms of intense technological expansion in some Brazilian rural regions. This is, undoubtedly, the most important period of Brazilian agriculture, and for this reason, as aforementioned, a simplified division in periods would divide Brazilian agrarian development into two periods: before and after the decade of economy-production modernization in the 1970s.

The decisive relevance of those years that presented extremely high growth rates is essentially due to the fact that the new economy logic was implemented, together with its corresponding formal requirements, which would gradually but radically change social behaviors. Those were the years when the roots of a new sociability were formed, at that time still restricted to the regions that the military regime discretionarily chose to give priority when it granted favorable credit resources, as well as other agriculture-expansion mechanisms, such as infrastructure expansion, also fostering the creation of a comprehensive rural extension and technical assistance service. More important yet because of its future consequences in those years (in 1972) was the creation of Embrapa, that previously served as in-

cubator for new technologies customized for Brazilian biomes, which would prove to be one of the most relevant and successful decisions made by the military governments. At the end of this phase, a “different Brazil” would emerge, whether in cities or in some rural areas, expanding its economy infrastructure and high rate of urbanization, with a new social development potential (MELLO; NOVAIS, 2009). These changes ensued from an intentional and profound movement to foster macroeconomic restructuring, strongly backed by external savings, which would generate the foreign debt that would comprise the next phase. For illustration purposes, it should be noted that in those years, approximately one-fourth of international investments abroad were made in Brazil, resulting in a significant change in Brazil's macroeconomic profile.

Following the successful model of agricultural modernization implemented in post-war United States, the Brazilian government irrigated rural regions with large and low-cost credit, fostering technological transformation to agricultural activities (KAGEYAMA; SILVA, 1983). Thus, the Brazilian agroindustrial park, boosted financially with the implementation of technological packages that were granted to rural producers. This tacit alliance between producers (selectively chosen in some regions, especially large-size producers), the new agroindustrial sector and Government policies finally enabled the parting away from the lethargic agriculture of the past. This resulted in the establishment of a new sociability – now capitalist – that gradually would be consolidated throughout the Brazilian rural scenario (especially since the second part of the 1990s). It is for the aforementioned reasons that the economy expansion decade of the 1970s represents a true “turning point” for the development of Brazilian economy and society. It is also important to note that in this second period, from 1960 to 1980, a strong relocation wave took place, where some 30 million Brazilians moved from rural areas to urban centers. Thus, the urbanization process was accelerated, definitely breaking away from Brazil's agrarian and agriculture standard of the past.

This strong transforming dynamics ended in the disastrous year of 1981, when Brazil finally reaped the impacts of the turbulence from the previous decade, with the two oil shocks and the ensuing macroeconomic crisis that hit advanced capitalist countries; they led to new and unprecedented inflation rates, unemployment and reorientation of the macroeconomy policy. The greatest symbol representing this new phase was the highest negative growth rate of Brazilian economy in 1981 (-4.3%), only compared in our history to an equivalent rate observed in 1990. Under this scenario of imbalance, a new economy mindset would gradually arise, which would later be called neoliberalism, especially during the 1990s (GLYN, 2006).

When the overall data are studied for the Brazilian case, the 1980s were the so-called "lost decade" and comprise the third phase of the post-war agrarian development. That decade was affected by low growth rates for the Brazilian economy, which in average declined to only 2.4% annually, where inflation increased and the monumental foreign debt put a straight-jacket on economy, posing a huge challenge on rural producers. Those years were marked by repeated economic imbalances, where actual prices paid to producers were usually low (as domestic and foreign demand was insufficient, forcing prices to fall). However, with agriculture suffering the impact of adverse factors, the 1980s witnessed extraordinary gains in quality for Brazilian society. I am making reference to the unprecedented fact that in this decade there was the consolidation in the standard of food supply and agricultural inputs, aligned to the existing demand. This type of articulation would always be in place in future years, leaving behind the situations of temporary food shortage that erratically marked the Brazilian agrarian history.

This outstanding result was caused by another factor ensuing from the previous phase, but consolidated in this third period; in other words, the first fruit of social behavior marked by a new sociability. Another new aspect of those years was that results from agricultural

production would also ensue from productivity gains and not only from expanding crop areas, like in the past. In other words, the modernization of the previous decade and the intense absorption of an actually capitalist logic started to change social behavior among a growing number of producers; gradually, this new sociability motivated the better management of the activity, seeking results that would also incorporate productivity gains.

The fourth phase of Brazilian agrarian development was symbolically started in 1991, when the Asuncion Treaty was signed, which gave origin to Mercosul, thus inaugurating trade deregulation that is one of the aspects of that phase. In that decade, different aspects would turn those years in a unique period of Brazil's rural history. They were critical years for many segments of producers, which were reflected in two movements. On the one hand, the actual prices paid to producers were even lower than in the previous phase (BARROS, 2010). However, on the other hand, the domestication of the monetary imbalance that marked Brazil since the early 1980s, with repeated and unsuccessful inflation adjustment plans, was established with the stability obtained in 1994 with the Real Plan, whereby producers would have to pay a price. Lower land price, ensuing from monetary stability, caused loss of asset value, and this, for many years in that decade agricultural activities were strongly hindered, leading to persistent reduction. From the economy point of view, for rural producer more integrated to trade markets it was a very unrestful decade, where profitability levels were often degrading.

This scenario of uncertainties also brought about emergency as a new factor, now more emphasized in land disputes, where a model of property invasion was installed, especially by the Landless Workers' Movement (MST), to expand in the following years. Thus, a process of political awareness started in the relationship between producer organization, inciting disputes and conflicts that would spread through-

out Brazil. Finally, two other factors would typify this decade.

One was the regulation of social rights to rural workers, provided for the 1988 Constitution, universalizing rights previously denied to a large number of Brazilian, especially rural working women that before the Constitution lived under the unacceptable condition of substandard citizens, where they were not entitled to rural retirement plan, for example (DELGADO; CARDOSO JÚNIOR, 2000). In practical terms, the scope of those benefits are translated into monetary compensation for the poorer social segments of the rural region, which is an undeniable political conquest, albeit partial, to democratize social relations in the rural region.

The other, typical of this fourth phase, was the institutionalization of the "Family farming" concept, formalized with the creation of Pronaf in 1995, which became a law in 2006. This change would bring about long-term consequences, segmenting the group of farmers into two large groups, which became identified by arbitrary criteria (parameters that lacked any theoretic fundament).

The initial objective of the proposed concept was only to provide access to public funding, and hence it was necessary to adopt objective criteria to place producers into categories. However, in the following years there was an exaggerated segmentation, which reflects, first and foremost, the political disputes between producer organizations that were often inflamed by ideological motivation not always explicit (NAVARRO, 2010a).

Finally, there is a last and more recent phase of this proposed division in periods (the fifth), starting in the late 1990s, with the boom of agricultural products, stimulated by the astounding growth of Chinese demand, one of the new food importers. It is a period of economic intensification and prosperity, which actually had started much earlier, but gained momentum at the end of the decade until it was halted by the 2008 financial crisis.

This phase was built on a technical-productive base that over the last 30 years, after the establishment of the aforementioned changes in relation to the 1970s, is fundamentally different than other past phases of the Brazilian rural history. For sure, the greatest change was that productivity became the main driver for agricultural activity, now radically changing social behavior in most rural regions, and definitely implementing the essence of a capitalist rationality as its development driver. Gasques et al. (2010) analyze this period as follows:

[...] 6.5% of the increase of agricultural products from 1970 to 2006 was due to total productivity increase of factors, and 35% due to increase of quantity of inputs. In the period 1995–2006, 68.0% of product growth was due to productivity increase. Hence, productivity has been the main driver for the growth of Brazilian agriculture. (GASQUES et al., 2010, in press).

In the same article, the authors describe archetypical changes leading to a capitalist logic, compared to the last 30 years. For example, the relative reduction of costs with workforce, while expenditures with agroindustrial inputs increase in the same proportion, such as inventories of tractors, agrochemicals, fertilizers and soil additives, to mention but a few. In sum, this fifth phase now addressed represents the growing monetarization of social life and market expansion that would determine social relationships in those regions, as well as the establishment of the model for modern agriculture. Briefly, it is capitalist logic that now rules without any type of hindrance production activities and social behavior throughout practically all the Brazilian rural scenario.

Another feature of this fifth phase lies in the institutional plan, when the Ministry for the Environment was granted autonomy in 1999, where it was before submitted to other ministerial imperatives, and the creation of the Ministry for Land Development in the same year. During the period at hand, the Ministry for the Environment, which reports to its scope of action, has been able to "pool" the chances of expansion

for the agricultural activity by creating different norms that limit the action of producers. In turn, the Ministry of Agrarian Development has been stressing producer segmentations at extremely high rates, rendering the classification of family and non-family an antimony that causes visible harmful effects to model a logical and consistent government action.

Finally, in this phase there is the inciting of the more evident political disputes in the rural milieu involving Government and producer organizations. Although the MST is still more active in some regions, it is quite possible that in the coming years confrontation will not ensue from the landless organization, which is currently loosing political ground (NAVARRO, 2010b), but rather a dispute for public funding. This potential conflict may oppose the production funding needs of producers that are more market-integrated to the need of funding of family producers. The latter are institutionalized under a new law, where they are now granted substantial political and institutional support in this dispute that must be arbitrated and solved in a more transparent and republican manner by the Brazilian Government.

Recent changes and their implications for governmental action

Contemporary Brazilian agrarian history, briefly addressed in the previous section, certainly build over time a series of social, economic and political-institutional changes that must be studied in depth. Ensuing interpretations will surely generate empiric evidence elements that may support with greater logic depth governmental action in the years to come. Different processes could be discussed under this brief essay; however, as it is not possible to address them in detail, only some of the major changes made to Brazilian rural regions are addressed, which brought about different consequences for the economy activity, Government action and the rural population itself.

Possibly, the principal change was the more comprehensive social process mentioned at the end of the previous section – materialization – ever so more comprehensive and deeper, of a new sociability that determined social behavior. Social life monetization is not just a rhetoric and generic expression or an abstract sociological concept; it implies concrete and empiric situations that call for new social arrangements, new policies and new institutional formats. As agricultural activities became part of new economic and financial circuits, which involve a large number of producers, it is mandatory to make a rigorous analysis of those processes and new requirements that multiple market requirements impose on rural families.

An illustration of this reality was assessed in the 2006 Census and confirmed by Hoffmann and Ney when they called attention to the fact that “there is a clear trend to the decrease of the number of non-owners: partners, lessees and users” (HOFFMANN; NEY, 2010a, chap. 7, in press). In other words, a capitalist *ethos* is formed that becomes the determining factor, and among other aspects, this new rationality affirms the notion of property that renders the forms of access to land as “dated” as in the past, when sociability first started.

Another example of this new context and its urgency for analysis is discussed in a recent article by Dias (2010). Although a more specific theme is under study – the indebtedness of the producers – the author emphasizes the “gray zone” where a large number of producers, currently integrated to a new production dimension, must learn where they stand. According to the author,

[...] the technological standard of competitive agriculture requires a sophisticated monitoring of costs, which makes the resistance of producers to greater formalization of their responsibilities acceptable.

[...] Rural leaders rightly complain that urban citizens do not acknowledge the particularities of rural scenario, but in this case it is the rural citizen that must acknowledge the need to formalize the agreements between individuals and Government. (DIAS, 2010, chap. 10, in press).

Maybe the most important macroeconomic evidence that supports this new social mindset of today is the comparison of initial government funding – so strong on the 1970s – and funding sources that are currently used by producers to enable their activity. Over these 40 years, there was a significant transition between government funding and public expenditures for agriculture toward private funding. Despite the still existing undesirable informality of the agreements (DIAS, 2010), there is a strong change between the initial stimulus granted by the government, which initiated the technological modernization process of the 1970s, and current funding mechanisms for the agricultural activity. Public expenditures for agriculture even grew in the 1980s, when they accounted for 12% of the federal budget, but have varied from 1% to 2% in this decade. However, rural credit reached maximum figures in 1979 and has been dropping over the last years at 10%–20% of that maximum value (BARROS, 2010).

This economic intensification assumes, for example, access to information and knowledge control that are usually unknown or poorly known by Brazilian farmers. Hence, notwithstanding the spectacular increase of production and productivity in Brazilian agriculture during recent years, the high number of uneducated producers is alarming. An example are the low salaries paid (in 2008, half of the farm workers were paid less than the minimum salary) and the insufficient demand for qualified work force. In sum, compared to production changes, the work market still relates substantially to the agrarian past. In other words:

[...] the occupational structure of the rural environment transferred into the 21st Century, which articulates old and new forms of work and production relationships, recorded by occupation polarizations that should go against the development level reached by Brazil (BUAINAIN; DEDECCA, 2010, chap. 5, in press).

Remembering the old debate about the coexistence of “two Brazils,” changes hereby presented about Brazilian agrarian development

reinforce the existence of the “crisis of the new,” i.e. those traumatic historical periods when new social ways emerge, but old social relationships (or the old ruling sociability) resist taking a bow. Under new angles, the changes that Brazilian agriculture has undergone with the significant growth of production and productivity and likewise with the financial irrigation brought about by performance in so many rural regions. This occurs not only in the old production zones of the Central-South or the sugar-producing Northeast, but also – first and foremost – in the new agriculture regions, notably the Central-West regions that is becoming the most important Brazilian agricultural region.

However, this abundance in production is visibly contrasted, for example, with the high concentration of production, as shown in a very relevant article by Alves and Rocha (2010). After working with data from the 2006 Agricultural Census, the authors show that the production strength of Brazilian agriculture actually lies in the relatively small number of farms (8.2% of the total) that concentrate approximately 85% of total production, including what is traded and earmarked for self-consumption. Even more surprising: of that total, only 0.4% of farms accounted for 51% of total production.

Finally, alongside with this strong structural heterogeneity that is the trademark of the Brazilian rural scenario, another change occurred, mainly since the 1990s, which was the consolidation of Brazilian democracy. It was under this political regime – that thrived until the Constituent – where rural regions faced the inciting of conflicts between different groups of stakeholders. Hence, it is probable that Government action in the future may require improved ability to judge and arbitrate when it implements its policies or redistributes gains and losses among rural social classes. However, the creation of the political mindset of Brazilian rural area, which is a desirable ideal because it reflects the sedimentation of Brazilian democracy and rural society, requires a much more competent Government than the current one.

The main challenges for governmental action

The most important challenges for Brazilian agriculture, and consequently for government action stem from different approaches, all of which are inter-related. Firstly, from the financial point of view and producer indebtedness. Production funding has been discussed using antagonistic arguments, at times emphasizing the need to be increased to comply with production increase, at times professing a liberal vision by which agricultural activity, as any other economy activity, would be subject to market vicissitudes and its inherent risks. However, Barros (2010) consistently suggests that subsidies can be interpreted as short-term distortions, but that will not always be the case if they are on the long term. On the other hand, indebtedness is also given contrary or even contradictory assessment by some authors that acidly criticize "non-payment" practices (SILVA, 2010), while others, even acknowledging producers' need to comply more transparently to the formalization of economy, propose new mechanisms to deal with that situation (DIAS, 2010). In other words, these contradictory points of view show the very need to identify means of funding that prevent indebtedness, making it more harmonious and balancing the future development of agriculture.

In turn, it is probable that the economic-redistributive challenge that was demanded for such a long time in the past will gradually cease to be a dilemma to be solved. This is directly related to the distribution of land ownership. Hoffmann and Ney (2010) compare the census results and show there are resilient indicators of land inequality, placing Brazil as one of the countries with the largest concentration of land ownership in the world, with the Gini index calculated at 0.856, according to data of the 2006 Census. Despite the fact that presently the measures to change this undesirable scenario of land ownership of distribution are still part of

the political agenda, and even if government action intends to continue with the national land reform policy, it is possible that these demands will be strongly deflected over the coming years. Persistent urbanization is gradually making this policy obsolete, and in the new future this issue will become increasingly set aside, where it no longer will pose a greater challenge to Brazil.

Another current challenge, the environmental one, has two trends. One ensues from the "territorial constraint" to the expansion of crop areas that were imposed by regulations approved by environmental organisms. It can be affirmed that presently the Cerrado region is the last agricultural expansion region, as the remaining biomes have already been occupied or are to a certain extend forbidden to be exploited, as in the case of the Amazon biome. If on the one hand those limits hinder the entrepreneurial action of rural producers, on the other it could encourage farmers to increase their productivity using the area already occupied by crops and cattle, which at the medium-term could bring general benefits for the economy. The other trend ensued from the perception of the limitations of the technological format called "modern agriculture," which is a vision shared by many scholars (MACINTYRE et al., 2009). These limitations (energy-related, environmental and financial) are demanding a "second green revolution" that could be on its way, but that is yet to happen under new technological formats for different ecosystems.⁴

The third challenge that calls for innovative government action is related to ongoing social processes. They are diverse and their consequences are many, related to agrarian development and rural regions, but two stand out. The first one is demographic, representing the aging of the rural population, as a large part of their youngsters have migrated to urban centers or have given up the agricultural activity. This behavior, associated to the smaller number of children per couples that live in rural regions

⁴ In his relevant article, Favareto (2010) shows additional aspects about the dilemmas involving economic growth, environmental conservation and social cohesion.

account for the decrease of population in those areas. The second social process is related to the still high poverty rates in rural regions, especially in the Northeast region. Alves and Rocha (2010) studied this group and identified that the alarming high figure of 73% of the total of properties counted by the Census where the family income based on production is less than the monthly minimum salary (in Reais of 2006). In all, those establishments account for only 4% of total production; however, there are over 3.77 million establishments where income is totally insufficient. As such, these groups should be given priority if any form of rural development strategy is implemented in Brazil.

A fourth challenge for the Brazilian rural region is related to the relationship policy between producers and their organizations. However, unlike what would be expected, it is not the case to predict a growing opposition between the MST and its actions, and some organizations that represent the great land owners. The organization of the rural landless workers seems to be undergoing a process of loss of political strength, which can accelerate (NAVARRO, 2010b). In truth, this political aspect will become clearer in the coming years, opposing the groups of producers that are currently divided into family and non-family. This is one of the greatest challenges that defy government policies, as it is the dispute for the meager government funds.

Finally, the greatest of all challenges that provokes a consistent action from the Government in relation to the rural scenario takes place at the institutional level and is related to the urgent need to discuss and implement a rural development strategy for Brazil. It should be inspired by a systemic logic that removes existing misguided concepts, such as the aforementioned institutional segmentation between producers. It should overcome the existing ministerial hybridity that hinders national interests. It should, lastly, address the growing need of greater logistics consistency and infrastructure improvement (warehouses and roads, to mention but a few). However, this strategy must be

debated, where pre-established imperative convictions and prejudice are set aside in order to find a more effective and logic way into the future where the aforementioned challenges can be overcome. That is the only path towards a sustainable rural development in Brazil.

Conclusions

This brief article presents a generic and simplified overview of the Brazilian agrarian development over the last 50 years with the intention of highlighting some of its most decisive periods. Those periods and the main changes that took place over time should be the base for discussions about government action for the Brazilian rural scenario, specifically in relation to the Ministry of Agriculture, Livestock and Food Supply.

The main thesis of this article insists that the group of changes that caused somewhat radical historical transformations to the Brazilian agrarian profile now require a more open analysis approach by whoever is interested in this subject, with the purpose of better defining the deadlocks now posed to Brazilian agricultural activities. Starting with the harmful ministerial hybridity that nowadays divides Brazilian producers, it is mandatory to propose an effective government strategy that can address different economic and social agents that are directly or indirectly related to the rural scenario.

The concise history of agriculture in the contemporary period presented by the text analyses the main processes and changes related to current challenges and deadlocks. If they are correct, even in part, these themes will call for an urgent nationwide debate, where greater levels of analytical convergence may be identified, and maybe via a new agreement matrix it will be possible to implement a true rural development policy for Brazil, guided by a single government area with institutional legitimacy and history to carry out this task – the Ministry of Agriculture, Livestock and Food Supply.

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