



EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA  
DEPARTAMENTO DE DIRETRIZES E MÉTODOS DE PLANEJAMENTO

**THE ROLE OF FARMING AND FARM MANAGEMENT IN MY  
SOCIETY: THE CASE OF AN EMERGENT COUNTRY\***

**Elmar Rodrigues da Cruz**

**Junho, 1980**

THE ROLE OF FARMING AND FARM MANAGEMENT IN MY SOCIETY: THE CASE OF AN EMERGENT COUNTRY\*

Elmar Rodrigues de Cruz

EMBRAPA, Brazil\*\*

ABSTRACT

This presentation is divided in four headings:

- a brief account will be given of the problems faced by the agricultural sector in the 50.s and 60.s when the government decided to adopt import substitution policies in order to foster industrial growth. The Brazilian experience might provide some lessons to other LDC's (less developed countries) in similar conditions. Moreover this background information will serve the purpose to highlight the importance of agriculture in the Brazilian economic development process;
- the new trends taken by the Brazilian agriculture in the 70.s are then shown. Due to several circumstances including relative prices there is now in Brazil a modern, diversified sub-sector oriented towards exports and a traditional sub-sector mainly concerned with crops for domestic consumption;
- the next section shows the importance of farm management at both farm and policy levels. Although the objectives of farm management are worldwide identical, the conditions prevailing in emergent countries differ from those found in developed societies. For example major differences lie in the way information is acquired by farmers, in the cost of information, and in lack of production alternatives due to inadequate marketing channels in LDC's.
- finally the paper indicates the need of LDC governments to emphasize the training of students and extension officers in farm management techniques.

---

\* Invited paper to be presented at the fourth International Farm Management Congress - Israel, June 1980.

\*\* The author is Economist of EMBRAPA (the Brazilian Corporation for Agricultural Research), affiliated to the Ministry of Agriculture. The views expressed here do not necessarily reflect those of EMBRAPA.

THE ROLE OF FARMING AND FARM MANAGEMENT IN MY SOCIETY: THE CASE OF AN EMERGENT COUNTRY\*

Elmar Rodrigues de Cruz

EMBRAPA, Brazil\*\*

ABSTRACT

This presentation is divided in four headings:

- a brief account will be given of the problems faced by the agricultural sector in the 50.s and 60.s when the government decided to adopt import substitution policies in order to foster industrial growth. The Brazilian experience might provide some lessons to other LDC's (less developed countries) in similar conditions. Moreover this background information will serve the purpose to highlight the importance of agriculture in the Brazilian economic development process;
- the new trends taken by the Brazilian agriculture in the 70.s are then shown. Due to several circumstances including relative prices there is now in Brazil a modern, diversified sub-sector oriented towards exports and a traditional sub-sector mainly concerned with crops for domestic consumption;
- the next section shows the importance of farm management at both farm and policy levels. Although the objectives of farm management are worldwide identical, the conditions prevailing in emergent countries differ from those found in developed societies. For example major differences lie in the way information is acquired by farmers, in the cost of information, and in lack of production alternatives due to inadequate marketing channels in LDC's.
- finally the paper indicates the need of LDC governments to emphasize the training of students and extension officers in farm management techniques.

---

\* Invited paper to be presented at the fourth International Farm Management Congress - Israel, June 1980.

\*\* The author is Economist of EMBRAPA (the Brazilian Corporation for Agricultural Research), affiliated to the Ministry of Agriculture. The views expressed here do not necessarily reflect those of EMBRAPA.

THE ROLE OF FARMING AND FARM MANAGEMENT IN MY SOCIETY: THE CASE OF AN EMERGENT COUNTRY

Elmar Rodrigues da Cruz  
EMBRAPA, Brazil

THE BRAZILIAN AGRICULTURE IN THE 50.s AND 60.s<sup>1/</sup>

In this section I shall not attempt to repeat the excellent historical background of the Brazilian agriculture given by Dr. Wehrle in the last IFMA Congress in Hamburg<sup>2/</sup>. I shall emphasize instead the path taken by the agricultural sector as a result of government policies in the 50.s and 60.s. This background is useful for a better understanding of the issues discussed in this paper.

The early 50.s witnessed an intensification of the import substitution policy adopted by the Brazilian government. The justification for this policy was that free trade and the principle of comparative advantage among countries would be against the interests of latin-american countries. It was argued that world demand for agricultural commodities was prices and income inelastic. Increased production of these commodities could only be exported to the developed countries at relatively lower prices, and thus, income generated by productivity gains would be transferred to the importing countries. By importing consumption goods at more elastic prices, LDC's would then face chronic balance of payments deficits, due to the deterioration of the terms of trade. LDC's would then be better-off in the long run by producing domestically consumption goods, through import substitution. This policy would enable the development of a diversified industrial sector, which would then foster economic growth. Further support for the import substitution policy came with the publication of economic development theories based on two-sector models<sup>3/</sup>. These models suggested the existence in many LDC's of an agricultural sector with an infinitely elastic labour supply. Although agricultural labour was employed to a point of zero marginal product, wage-earners were paid in relation to their average productivity. Meanwhile in the industrial sector of the economy, labour was paid according to their marginal productivity. As a result, society as a whole would obtain welfare gains by transferring labour from agriculture to the industrial sector, with the implication that the later should be protected by tariffs in order to enable the creation of industrial jobs. The role of agriculture would be to supply labour and cheap food to the urban sector. In countries without land restrictions, eventual food shortages could be quickly overcome by the incorporation of new land to the productive process. The role of the public sector would then be to provide infra-structure in terms of new roads and storage facilities so that the agricultural frontier could be extended.

In broad terms, the Brazilian authorities operated according to this framework. In order to facilitate imports of capital goods to establish new plants, the exchange rate was overvalued for many years. In fact the exchange rate in Brazil was kept fixed from 1946 to 1953, whilst domestic inflation rose 85% in the same period. Under this regime of an overvalued exchange rate, the developing industrial sector was protected by high tariffs on imported consumption goods and intermediate goods<sup>4/</sup>. In average, domestically produced consumption goods received 190% of effective protection and intermediate goods around 50%.

Under the policy of import substitution the urbanization forces were strengthened, so that for exemple, in 1950 only 36% of the Brazilian population lived in urban areas, whereas in 1970 this figure raised to 56%. Furthermore, the industrial sector developed very rapidly, because the supply of goods produced by the sector could cater for two sources of demand: a) the expanding domestic demand as a result of population growth and increases in per-capita income, and b) the derived demand of the market of previously imported consumption goods,

THE ROLE OF FARMING AND FARM MANAGEMENT IN MY SOCIETY: THE CASE OF AN EMERGENT COUNTRY

Elmar Rodrigues da Cruz  
EMBRAPA, Brazil

THE BRAZILIAN AGRICULTURE IN THE 50.s AND 60.s<sup>1/</sup>

In this section I shall not attempt to repeat the excellent historical background of the Brazilian agriculture given by Dr. Wehrle in the last IFMA Congress in Hamburg<sup>2/</sup>. I shall emphasize instead the path taken by the agricultural sector as a result of government policies in the 50.s and 60.s. This background is useful for a better understanding of the issues discussed in this paper.

The early 50.s witnessed an intensification of the import substitution policy adopted by the Brazilian government. The justification for this policy was that free trade and the principle of comparative advantage among countries would be against the interests of latin-american countries. It was argued that world demand for agricultural commodities was prices and income inelastic. Increased production of these commodities could only be exported to the developed countries at relatively lower prices, and thus, income generated by productivity gains would be transferred to the importing countries. By importing consumption goods at more elastic prices, LDC's would then face chronic balance of payments deficits, due to the deterioration of the terms of trade. LDC's would then be better-off in the long run by producing domestically consumption goods, through import substitution. This policy would enable the development of a diversified industrial sector, which would then foster economic growth. Further support for the import substitution policy came with the publication of economic development theories based on two-sector models<sup>3/</sup>. These models suggested the existence in many LDC's of an agricultural sector with an infinitely elastic labour supply. Although agricultural labour was employed to a point of zero marginal product, wage-earners were paid in relation to their average productivity. Meanwhile in the industrial sector of the economy, labour was paid according to their marginal productivity. As a result, society as a whole would obtain welfare gains by transferring labour from agriculture to the industrial sector, with the implication that the later should be protected by tariffs in order to enable the creation of industrial jobs. The role of agriculture would be to supply labour and cheap food to the urban sector. In countries without land restrictions, eventual food shortages could be quickly overcome by the incorporation of new land to the productive process. The role of the public sector would then be to provide infra-structure in terms of new roads and storage facilities so that the agricultural frontier could be extended.

In broad terms, the Brazilian authorities operated according to this framework. In order to facilitate imports of capital goods to establish new plants, the exchange rate was overvalued for many years. In fact the exchange rate in Brazil was kept fixed from 1946 to 1953, whilst domestic inflation rose 85% in the same period. Under this regime of an overvalued exchange rate, the developing industrial sector was protected by high tariffs on imported consumption goods and intermediate goods<sup>4/</sup>. In average, domestically produced consumption goods received 190% of effective protection and intermediate goods around 50%.

Under the policy of import substitution the urbanization forces were strengthened, so that for exemple, in 1950 only 36% of the Brazilian population lived in urban areas, whereas in 1970 this figure raised to 56%. Furthermore, the industrial sector developed very rapidly, because the supply of goods produced by the sector could cater for two sources of demand: a) the expanding domestic demand as a result of population growth and increases in per-capita income, and b) the derived demand of the market of previously imported consumption goods,

which could no longer be imported due to the high tariffs mentioned above. However the growth of the industrial sector created some distortions which are present to some extent until now. The capital intensive nature of the newly established industries was a general rule rather than an exception 5/. Thus, the rate of labour absorption by the industry was inferior to the rate of growth of the labour force, and this resulted in unemployment in urban areas with serious social consequences.

Moreover, Brazil, like many LDC's, has a relatively abundant supply of unskilled labour, whereas highly skilled professionals are in short supply. Given the technological nature of the newly established industrial complex, skilled professionals were proportionately more required than unskilled workers. The intense competition for skilled labour (in short supply) resulted in an extremely large distortion in the wages structure, with an impact on the concentration of income distribution.

The policy of import substitution was harmful to the agricultural sector in several ways. The tariff system to protect the industrial sector had the effect of increasing the prices of "modern" agricultural inputs (fertilizers and machinery among others), and the overvalued currency discriminated against agricultural exports. The result was a net transfer of resources to the industrial sector 6/. The high cost of modern inputs paid by the agricultural sector in relation to international prices acted as a barrier to the modernization of agriculture, inducing the agricultural product growth purely in terms of the agricultural frontier expansion. No significant increases in the productivity of staple food crops (rice, maize, beans and cassava) were recorded during this period. In an attempt to keep domestic prices low, the authorities followed the model "vent for surplus" in which only the "surplus" of the agricultural output, after supplying the domestic market, was allowed to be exported. Thus the urban consumers were benefited, at the expense of the agricultural sector. Long run policies to achieve the same objective of reducing food prices were overlooked. In particular, investments in agricultural research, which could shift to the right the supply of agricultural commodities, lowering thus agricultural prices 7/, received a very low priority in the period.

Four main reasons were put forward to explain the poor performance of the agricultural sector:

- a) The agrarian structure was blamed. Land reform was considered essential in order to provide better opportunities to the landless farmers 8/;
- b) Inadequate price policies for the domestic and export markets, coupled with a lack of research investments 9/;
- c) The existence of a self-control mechanism, because once the agricultural sector has reached a "satisfactory degree of modernization", further technological improvements in the agricultural sector will be met by insufficient demand of the non-agricultural sector. The agricultural prices will decline to a point in which there will be a tendency for farmers adopting new technologies to revert to traditional practices 10/;
- d) Abundant supplies of land and labour stimulated the use of traditional technologies. Modernization in agriculture occurs mainly as a response to factor scarcities 11/.

Nevertheless, despite of the evidence that the Brazilian agriculture did not reach its potential in the period, there is a case to claim that agriculture played a fundamental role in the economic development process of Brazil, because:

- i) Thanks to an abundant availability of traditional inputs (land and labour) cheap food could be produced so as to satisfy the needs of the population, with the exception of wheat;
- ii) A transfer of income and labour to the urban sector was possible, as I argued earlier;
- iii) A substantial share of the Brazilian exports came from agriculture, despite of the discriminations against the sector mentioned earlier 12/.

which could no longer be imported due to the high tariffs mentioned above. However the growth of the industrial sector created some distortions which are present to some extent until now. The capital intensive nature of the newly established industries was a general rule rather than an exception 5/. Thus, the rate of labour absorption by the industry was inferior to the rate of growth of the labour force, and this resulted in unemployment in urban areas with serious social consequences.

Moreover, Brazil, like many LDC's, has a relatively abundant supply of unskilled labour, whereas highly skilled professionals are in short supply. Given the technological nature of the newly established industrial complex, skilled professionals were proportionately more required than unskilled workers. The intense competition for skilled labour (in short supply) resulted in an extremely large distortion in the wages structure, with an impact on the concentration of income distribution.

The policy of import substitution was harmful to the agricultural sector in several ways. The tariff system to protect the industrial sector had the effect of increasing the prices of "modern" agricultural inputs (fertilizers and machinery among others), and the overvalued currency discriminated against agricultural exports. The result was a net transfer of resources to the industrial sector 6/. The high cost of modern inputs paid by the agricultural sector in relation to international prices acted as a barrier to the modernization of agriculture, inducing the agricultural product growth purely in terms of the agricultural frontier expansion. No significant increases in the productivity of staple food crops (rice, maize, beans and cassava) were recorded during this period. In an attempt to keep domestic prices low, the authorities followed the model "vent for surplus" in which only the "surplus" of the agricultural output, after supplying the domestic market, was allowed to be exported. Thus the urban consumers were benefited, at the expense of the agricultural sector. Long run policies to achieve the same objective of reducing food prices were overlooked. In particular, investments in agricultural research, which could shift to the right the supply of agricultural commodities, lowering thus agricultural prices 7/, received a very low priority in the period.

Four main reasons were put forward to explain the poor performance of the agricultural sector:

- a) The agrarian structure was blamed. Land reform was considered essential in order to provide better opportunities to the landless farmers 8/;
- b) Inadequate price policies for the domestic and export markets, coupled with a lack of research investments 9/;
- c) The existence of a self-control mechanism, because once the agricultural sector has reached a "satisfactory degree of modernization", further technological improvements in the agricultural sector will be met by insufficient demand of the non-agricultural sector. The agricultural prices will decline to a point in which there will be a tendency for farmers adopting new technologies to revert to traditional practices 10/;
- d) Abundant supplies of land and labour stimulated the use of traditional technologies. Modernization in agriculture occurs mainly as a response to factor scarcities 11/.

Nevertheless, despite of the evidence that the Brazilian agriculture did not reach its potential in the period, there is a case to claim that agriculture played a fundamental role in the economic development process of Brazil, because:

- i) Thanks to an abundant availability of traditional inputs (land and labour) cheap food could be produced so as to satisfy the needs of the population, with the exception of wheat;
- ii) A transfer of income and labour to the urban sector was possible, as I argued earlier;
- iii) A substantial share of the Brazilian exports came from agriculture, despite of the discriminations against the sector mentioned earlier 12/.

RECENT TRENDS OF THE BRAZILIAN AGRICULTURE 13/

In the late 60.s and early 70.s new trade policies were put into effect by the Brazilian authorities, which had a marked effect in the agricultural sector. Exchange rates became relatively more realistic with the introduction of the floating peg system. Under this system several "mini-devaluations" occur every year, at a rate approximately equal to the difference between the country's domestic inflation and the average inflation of Brazil's major trading partners, especially the U.S.A. and Western Europe. Moreover, most export controls were eliminated and the government provided especial incentives to stimulate exports, although these favoured more the industrial sector. At the same time, international prices of agricultural commodities sharply increased in the early 70.s. Thus, for the period 1971 to 1973 the exports of the agricultural sector more than doubled in value <sup>14/</sup>. On the other hand, production of staple food for the domestic markets is often subject to price controls and other forms of market intervention in order to keep food prices low. Production decisions are thus based on different factors:

- Producers of export crops respond to signals of international prices, without major market interventions.
- Producers of domestic consumption crops react to internal demand and government policies, which usually result in low price expectations at farm level.

This set of motivations, induced modern producers to concentrate their efforts on export crops <sup>15/</sup>, leaving the production of staple food crops largely to small, traditional farmers, since they require part of the output for own-farm consumption. A possible exception is the case of upland rice, a major crop for domestic consumption, which is also grown by large producers in newly developed areas, mainly to reduce the costs of pasture formation.

Due to the fact that modern farmers compete for the same factor markets (land and labour) of the traditional producers, there is presently an upward trend in factor prices. This trend, coupled with a policy of cheap food for the domestic market, is a possible explanation for the food shortages that occurred in the 70.s. Moreover, the expansion of the agricultural frontier is now more difficult than it was in the past. Opportunities to obtain cheap new land close to the urban areas are now no longer available.

The gap between staple food supply and demand could be illustrated if we consider the annual population growth of 2.7% for the period 1968-1976 together with a rate of growth of the agricultural product around 3.3% per year for the same period. If the income demand elasticity is assumed to be 0.5, and if the per-capita income grows at a rate of 6% per year, then the domestic demand for food would grow at a rate of about 6% annually, if the above assumptions are true. This figure is far above the 3.3% rate of growth on the side of supply <sup>16/</sup>. The poor performance of domestic consumption crops is partly explained by their low yields according to international standards. There is evidence that yields of rice, beans, maize and cassava are following a declining trend, at least for some regions of Brazil. This fact can be illustrated by table 1.

TABLE 1 - Rates of Growth of Yields for the Group: Rice, Beans, Maize and Cassava, for the Period 1948-1976, by Region.

| REGION                        | RATE OF GROWTH (%) |
|-------------------------------|--------------------|
| North                         | - 1.28             |
| Northeast                     | - 12.57            |
| Central-West                  | - 3.37             |
| Southeast (Without São Paulo) | - 4.42             |
| South                         | 7.17               |
| São Paulo                     | 16.34              |

Source: ALVES (1979).



RECENT TRENDS OF THE BRAZILIAN AGRICULTURE 13/

In the late 60.s and early 70.s new trade policies were put into effect by the Brazilian authorities, which had a marked effect in the agricultural sector. Exchange rates became relatively more realistic with the introduction of the floating peg system. Under this system several "mini-devaluations" occur every year, at a rate approximately equal to the difference between the country's domestic inflation and the average inflation of Brazil's major trading partners, especially the U.S.A. and Western Europe. Moreover, most export controls were eliminated and the government provided especial incentives to stimulate exports, although these favoured more the industrial sector. At the same time, international prices of agricultural commodities sharply increased in the early 70.s. Thus, for the period 1971 to 1973 the exports of the agricultural sector more than doubled in value <sup>14/</sup>. On the other hand, production of staple food for the domestic markets is often subject to price controls and other forms of market intervention in order to keep food prices low. Production decisions are thus based on different factors:

- Producers of export crops respond to signals of international prices, without major market interventions.
- Producers of domestic consumption crops react to internal demand and government policies, which usually result in low price expectations at farm level.

This set of motivations, induced modern producers to concentrate their efforts on export crops <sup>15/</sup>, leaving the production of staple food crops largely to small, traditional farmers, since they require part of the output for own-farm consumption. A possible exception is the case of upland rice, a major crop for domestic consumption, which is also grown by large producers in newly developed areas, mainly to reduce the costs of pasture formation.

Due to the fact that modern farmers compete for the same factor markets (land and labour) of the traditional producers, there is presently an upward trend in factor prices. This trend, coupled with a policy of cheap food for the domestic market, is a possible explanation for the food shortages that occurred in the 70.s. Moreover, the expansion of the agricultural frontier is now more difficult than it was in the past. Opportunities to obtain cheap new land close to the urban areas are now no longer available.

The gap between staple food supply and demand could be illustrated if we consider the annual population growth of 2.7% for the period 1968-1976 together with a rate of growth of the agricultural product around 3.3% per year for the same period. If the income demand elasticity is assumed to be 0.5, and if the per-capita income grows at a rate of 6% per year, then the domestic demand for food would grow at a rate of about 6% annually, if the above assumptions are true. This figure is far above the 3.3% rate of growth on the side of supply <sup>16/</sup>. The poor performance of domestic consumption crops is partly explained by their low yields according to international standards. There is evidence that yields of rice, beans, maize and cassava are following a declining trend, at least for some regions of Brazil. This fact can be illustrated by table 1.

TABLE 1 - Rates of Growth of Yields for the Group: Rice, Beans, Maize and Cassava, for the Period 1948-1976, by Region.

| REGION                        | RATE OF GROWTH (%) |
|-------------------------------|--------------------|
| North                         | - 1.28             |
| Northeast                     | - 12.57            |
| Central-West                  | - 3.37             |
| Southeast (Without São Paulo) | - 4.42             |
| South                         | 7.17               |
| São Paulo                     | 16.34              |

Source: ALVES (1979).

There is evidence that the good performance of the state of São Paulo and the southern region of Brazil is partly due to sizable investments in agricultural research and extension made in those regions by state agencies over the last 30 years 17/. Realizing the importance of agricultural research to stimulate agricultural growth, the federal government decided to create in 1972 the Brazilian Corporation for Agricultural Research (EMBRAPA), which started operating in April 1973.

EMBRAPA replaced the former National Department for Agricultural Research (DNPEA), which lacked funds and well trained personnel 18/. Now EMBRAPA has a budget estimated at US\$ 154.5 million (exchange rate of February 1980) with a training programme that enabled more than 800 researchers in the last 6 years to obtain a M.S. or a Ph.D. degree.

However other policy measures are necessary to ensure that research results are adopted by farmers. For that purpose agricultural credit has expanded very rapidly in the last 15 years. In 1960 for example the amount of loans to cover operational costs (operating loans) represented only 7% of the net agricultural product, and by 1975 this figure reached 37% 19/. More recently, the government substantially increased the minimum guaranteed prices to producers of crops for both domestic consumption and exports. Therefore analysts expect that for this decade agriculture in Brazil will be relatively better-off. On the whole, policy makers are now giving due credit to the importance of the agricultural sector.

#### THE ROLE OF FARM MANAGEMENT AT THE FARM AND POLICY LEVELS

My experience with developed countries suggests the existence of some preconditions to ensure the success of farm management in the sense it is described in textbooks 20/ and in graduate courses. In particular, widespread use of farm management tools and farm records is to a great extent dependent on an adequate communications network. For example, in developed countries most farmers have telephones and television sets. They receive mail daily, and many subscribe newspapers and periodicals. There are many periodicals in circulation specifically aimed at the farming community. Thus farmers acquire, at low cost, information about the latest developments and market trends of machinery, fertilizers, chemicals and other inputs. In order to compare the performance levels of their crops and livestock, farmers are induced to keep farm records. Therefore, most farmers are in a position to calculate yields and gross margins of the enterprises in their farms. These are compared with standards published periodically by universities 21/, agricultural colleges, and farming magazines. Thus when a farmer approaches his bank manager, for example, he knows his relative financial position and can support his loan applications with figures and facts.

In developing countries, information is in general: scarce, imperfect and expensive. Relatively few farmers are close to experiment stations to receive updated information on technological improvements. Only a minority of farmers receive periodicals and newspapers. Extension officers face the difficult task to cover wide distances, sometimes on roads of poor quality, to assist farmers. Postal communications in many rural areas are non-existent. Hence, the costs of technical assistance to farmers is much higher than in developed countries. Moreover production alternatives are in many cases very limited due to a lack of adequate marketing channels.

What is then the role of farm management in an emergent country? Bearing in mind Mr. Nix's words on the topic "Farm Management - Identical Objectives Worldwide under Different Conditions" presented at our last conference in Germany, I shall endeavour to answer this question at two levels: a) farm and b) government policy levels.

At farm level, farm management techniques will be more useful for farmers which keep farm records. In the state of São Paulo and in the southern part of Brazil for example, many large farms are run by managers which keep records in order to make progress reports to their owners. Cooperative members and modern farmers in general, also tend to keep some sort of farm records. Thus important decisions such as the building of a new milking parlour, the expansion of pastures, the choice of a cropping pattern and so on, can be made with the help

There is evidence that the good performance of the state of São Paulo and the southern region of Brazil is partly due to sizable investments in agricultural research and extension made in those regions by state agencies over the last 30 years 17/. Realizing the importance of agricultural research to stimulate agricultural growth, the federal government decided to create in 1972 the Brazilian Corporation for Agricultural Research (EMBRAPA), which started operating in April 1973.

EMBRAPA replaced the former National Department for Agricultural Research (DNPEA), which lacked funds and well trained personnel 18/. Now EMBRAPA has a budget estimated at US\$ 154.5 million (exchange rate of February 1980) with a training programme that enabled more than 800 researchers in the last 6 years to obtain a M.S. or a Ph.D. degree.

However other policy measures are necessary to ensure that research results are adopted by farmers. For that purpose agricultural credit has expanded very rapidly in the last 15 years. In 1960 for example the amount of loans to cover operational costs (operating loans) represented only 7% of the net agricultural product, and by 1975 this figure reached 37% 19/. More recently, the government substantially increased the minimum guaranteed prices to producers of crops for both domestic consumption and exports. Therefore analysts expect that for this decade agriculture in Brazil will be relatively better-off. On the whole, policy makers are now giving due credit to the importance of the agricultural sector.

#### THE ROLE OF FARM MANAGEMENT AT THE FARM AND POLICY LEVELS

My experience with developed countries suggests the existence of some preconditions to ensure the success of farm management in the sense it is described in textbooks 20/ and in graduate courses. In particular, widespread use of farm management tools and farm records is to a great extent dependent on an adequate communications network. For example, in developed countries most farmers have telephones and television sets. They receive mail daily, and many subscribe newspapers and periodicals. There are many periodicals in circulation specifically aimed at the farming community. Thus farmers acquire, at low cost, information about the latest developments and market trends of machinery, fertilizers, chemicals and other inputs. In order to compare the performance levels of their crops and livestock, farmers are induced to keep farm records. Therefore, most farmers are in a position to calculate yields and gross margins of the enterprises in their farms. These are compared with standards published periodically by universities 21/, agricultural colleges, and farming magazines. Thus when a farmer approaches his bank manager, for example, he knows his relative financial position and can support his loan applications with figures and facts.

In developing countries, information is in general: scarce, imperfect and expensive. Relatively few farmers are close to experiment stations to receive updated information on technological improvements. Only a minority of farmers receive periodicals and newspapers. Extension officers face the difficult task to cover wide distances, sometimes on roads of poor quality, to assist farmers. Postal communications in many rural areas are non-existent. Hence, the costs of technical assistance to farmers is much higher than in developed countries. Moreover production alternatives are in many cases very limited due to a lack of adequate marketing channels.

What is then the role of farm management in an emergent country? Bearing in mind Mr. Nix's words on the topic "Farm Management - Identical Objectives Worldwide under Different Conditions" presented at our last conference in Germany, I shall endeavour to answer this question at two levels: a) farm and b) government policy levels.

At farm level, farm management techniques will be more useful for farmers which keep farm records. In the state of São Paulo and in the southern part of Brazil for example, many large farms are run by managers which keep records in order to make progress reports to their owners. Cooperative members and modern farmers in general, also tend to keep some sort of farm records. Thus important decisions such as the building of a new milking parlour, the expansion of pastures, the choice of a cropping pattern and so on, can be made with the help

of partial budgeting or other planning techniques depending on the nature of the decision. Many cooperatives in the south-east and southern Brazil help their members in their decision making process with the aid of simple farm management tools, but the fact remains that the majority of farmers in Brazil are not members of cooperatives. The federal government is also trying to help farmers in this respect. For example, EMBRAPA, the Brazilian Corporation for Technical Assistance and Extension, has just prepared a Farm Management Manual initially aimed at the training of extension officers, but which in due time will be made available to the assisted farmers as well. EMBRAPA is working on a computer package, an extension of the so-called "farm management cards" <sup>22/</sup>, which will enable farmers to find out how the technologies in use stand in relation to recommended technologies. Success of these government initiatives will depend to some extent on data availability. The sooner farmers become convinced of the need to keep farm records the greater will be the role of these two government schemes in the future. Thus, the role of farm management tools is, at present, mainly potential at the farm level. However, even without farm records, farmers in developing countries face the same basic problem of farm management as those of developed societies <sup>23/</sup>: i) each farmer has goals which he seeks to satisfy; ii) he knows that the means available to satisfy goals are limited in supply, and iii) he knows that his resources can be put to alternative uses. Thus the problem faced by each farmer is basically of how to allocate the scarce resources amongst the various alternative uses so as to best satisfy his goals. The basic difference is that farmers in developing countries solve this problem intuitively, without the aid of formal techniques, and with limited information about new technological developments and on regional performance standards.

At the government policy level, the role of farm management in emergent countries is perhaps even more important. This is because in developing countries wrong policies can have far reaching consequences on the future of agriculture. Without a well developed structure of rural welfare programs, such as unemployment benefits, a developing country must carefully assess the impact of its policies. Policy assessment requires reliable data. The often used census data is not the best answer to the problem. Census data are generally obtained only at intervals of five years, or even ten years. Hence, periodical farm management surveys using samples of few, reliable farmers, should be used in addition to census data, so that the impact of policies such as credit, subsidies, major currency devaluations, investment on new roads and other infrastructure, can be assessed at farm level. Furthermore, government agencies would then have farm level data to identify possible gains and losses of new technologies and possible bottlenecks that might hinder the adoption of new research results. Changes bearing on the farm-household decision making unit and the imperfect knowledge about these changes have created the need for additional efforts in farm management education and research.

Government agencies would then be in a position to better understand the farmers' adjustment process to new circumstances, and if necessary compensatory measures could be taken so as to minimize the negative effects of important policies. Thus, in principle, the same farm management tools used by individual farm managers, could also be used by government agencies on representative farms. Hence farm management has also an important role to play at the policy level.

**CONCLUSIONS**

It is my belief that this presentation of the Brazilian case might contribute to a better understanding of the problems faced by LDC's in similar conditions. Recall for example the problems created by the policies of import substitution in the 50.s and 60.s. Further problems occurred in the 70.s as the policies to promote exports came into effect. Despite the problems mentioned in this paper, agriculture does play an important role in my society. Apart from wheat, which we still import almost 2/3 of its consumption, Brazil is in general self-sufficient in all commodities that are part of the daily diet of the population. Agriculture is still the major source of foreign exchange earnings, with exports more diversified than ever, and resources from agriculture are still being systematically transferred to the urban sector as I argued in the first section. Needless to say, the

of partial budgeting or other planning techniques depending on the nature of the decision. Many cooperatives in the south-east and southern Brazil help their members in their decision making process with the aid of simple farm management tools, but the fact remains that the majority of farmers in Brazil are not members of cooperatives. The federal government is also trying to help farmers in this respect. For example, EMBRATER, the Brazilian Corporation for Technical Assistance and Extension, has just prepared a Farm Management Manual initially aimed at the training of extension officers, but which in due time will be made available to the assisted farmers as well. EMBRAPA is working on a computer package, an extension of the so-called "farm management cards" <sup>22/</sup>, which will enable farmers to find out how the technologies in use stand in relation to recommended technologies. Success of these government initiatives will depend to some extent on data availability. The sooner farmers become convinced of the need to keep farm records the greater will be the role of these two government schemes in the future. Thus, the role of farm management tools is, at present, mainly potential at the farm level. However, even without farm records, farmers in developing countries face the same basic problem of farm management as those of developed societies <sup>23/</sup>: i) each farmer has goals which he seeks to satisfy; ii) he knows that the means available to satisfy goals are limited in supply, and iii) he knows that his resources can be put to alternative uses. Thus the problem faced by each farmer is basically of how to allocate the scarce resources amongst the various alternative uses so as to best satisfy his goals. The basic difference is that farmers in developing countries solve this problem intuitively, without the aid of formal techniques, and with limited information about new technological developments and on regional performance standards.

At the government policy level, the role of farm management in emergent countries is perhaps even more important. This is because in developing countries wrong policies can have far reaching consequences on the future of agriculture. Without a well developed structure of rural welfare programs, such as unemployment benefits, a developing country must carefully assess the impact of its policies. Policy assessment requires reliable data. The often used census data is not the best answer to the problem. Census data are generally obtained only at intervals of five years, or even ten years. Hence, periodical farm management surveys using samples of few, reliable farmers, should be used in addition to census data, so that the impact of policies such as credit, subsidies, major currency devaluations, investment on new roads and other infrastructure, can be assessed at farm level. Furthermore, government agencies would then have farm level data to identify possible gains and losses of new technologies and possible bottlenecks that might hinder the adoption of new research results. Changes bearing on the farm-household decision making unit and the imperfect knowledge about these changes have created the need for additional efforts in farm management education and research.

Government agencies would then be in a position to better understand the farmers' adjustment process to new circumstances, and if necessary compensatory measures could be taken so as to minimize the negative effects of important policies. Thus, in principle, the same farm management tools used by individual farm managers, could also be used by government agencies on representative farms. Hence farm management has also an important role to play at the policy level.

**CONCLUSIONS**

It is my belief that this presentation of the Brazilian case might contribute to a better understanding of the problems faced by LDC's in similar conditions. Recall for example the problems created by the policies of import substitution in the 50.s and 60.s. Further problems occurred in the 70.s as the policies to promote exports came into effect. Despite the problems mentioned in this paper, agriculture does play an important role in my society. Apart from wheat, which we still import almost 2/3 of its consumption, Brazil is in general self-sufficient in all commodities that are part of the daily diet of the population. Agriculture is still the major source of foreign exchange earnings, with exports more diversified than ever, and resources from agriculture are still being systematically transferred to the urban sector as I argued in the first section. Needless to say, the

analysis presented here is not intended to be exhaustive. Many aspects such as out-migration and regional inequalities were omitted. Dr. Mehrle's presentation at our last conference is rich in details on these aspects. Further details can be found in the references at the end of this paper, and many of which have at least an English summary.

Finally, it was noted that decision making at farm level in Brazil, as well as in many emergent countries, does not rely yet on modern farm management tools. However the role of managerial techniques is likely to increase as the means of communication in rural areas improve. Thus, as the costs of acquiring information become cheaper, its demand will surely increase. At the policy level the role of farm management is very important, because public funds are very scarce and policies need to be properly evaluated. For an adequate evaluation of the impact of policy measures, reliable data at farm level must be available.

The last point I would like to make, is that LDC governments should emphasize the training of students in agricultural colleges (high school level) and universities, on simple techniques such as farm records, cash flows, farm financial analysis, and partial budgeting. Meanwhile, extension agents should also be trained on managerial methods, so that the message can get across to farmers in due time. As we look ahead, the need for public support for extension efforts in farm management in Brazil, stems not only from a concern on more food production, but also from a growing emphasis on a more equitable social environment in agriculture.

FOOTNOTES

- 1/ This section is based on PASTORE (1979), HOMEM DE MELO (1979), SCHUH (1977), HOMEM DE MELO E ZOCCUN (1977) e ALVES (1979).
- 2/ See WEHRLE (1977).
- 3/ See LEWIS (1954).
- 4/ See HOMEM DE MELLO (1979) and PASTORE (1979).
- 5/ To illustrate this point, ALVES & PASTORE (1978) quote figures which show that in 1964 the industrial sector accounted for 35% of the GNP (gross national product) while the share of employment was only 8%. This figure is far below the comparative employment share in other countries with similar economic conditions.
- 6/ Figures quoted from ALVES (1979) suggest that a proportion between 11.6 to 19.1% of the GNP was transferred from agriculture to the industry in the period 1958-60.
- 7/ According to SCHUH (1976) there is a secular decline in the real price of agricultural commodities, as a result of technical change and the development of the economy. In the case of the U.S. only in the early 70.s is that this secular trend ceased to exist. This trend is linked with low price and demand elasticities of agricultural commodities (See JOHNSON, 1972).
- 8/ Recent evidence indicates that land reform in itself is not likely to solve the problem (RICHTER and KONSEN, 1979).
- 9/ See SCHUH (1974).
- 10/ See PAIVA (1975). RYFF (1976) argued that this hypothesis might occur only under very specific circumstances.
- 11/ This is the main argument of HAYAMI and RUTTAN (1971), when they introduce the hypothesis of induced innovation.
- 12/ In 1970, 58% of the Brazilian exports came from the agricultural sector. If the primary sector as a whole is considered (including animal production and minerals) then this figure raises to 90% (MENDONÇA DE BARROS & GRAHAM, 1978).
- 13/ This section is based on HOMEM DE MELO (1979), MENDONÇA DE BARROS & GRAHAM (1978) and ALVES & PASTORE (1978).
- 14/ Export crops among 30 others are mainly coffee, cotton, sugarcane, soyabeans, cocoa and citrus.
- 15/ For example, in 1967 Brazil produced 715.000 tons of soyabeans. In 1977 the production of this crop reached 12.5 million tons. There is a regional component in this trend, as 70% of the marketed agricultural production comes from the south, south-east and central areas of Brazil.

analysis presented here is not intended to be exhaustive. Many aspects such as out-migration and regional inequalities were omitted. Dr. Mehrle's presentation at our last conference is rich in details on these aspects. Further details can be found in the references at the end of this paper, and many of which have at least an English summary.

Finally, it was noted that decision making at farm level in Brazil, as well as in many emergent countries, does not rely yet on modern farm management tools. However the role of managerial techniques is likely to increase as the means of communication in rural areas improve. Thus, as the costs of acquiring information become cheaper, its demand will surely increase. At the policy level the role of farm management is very important, because public funds are very scarce and policies need to be properly evaluated. For an adequate evaluation of the impact of policy measures, reliable data at farm level must be available.

The last point I would like to make, is that LDC governments should emphasize the training of students in agricultural colleges (high school level) and universities, on simple techniques such as farm records, cash flows, farm financial analysis, and partial budgeting. Meanwhile, extension agents should also be trained on managerial methods, so that the message can get across to farmers in due time. As we look ahead, the need for public support for extension efforts in farm management in Brazil, stems not only from a concern on more food production, but also from a growing emphasis on a more equitable social environment in agriculture.

FOOTNOTES

- 1/ This section is based on PASTORE (1979), HOMEM DE MELO (1979), SCHUH (1977), HOMEM DE MELO E ZOCCUN (1977) e ALVES (1979).
- 2/ See WEHRLE (1977).
- 3/ See LEWIS (1954).
- 4/ See HOMEM DE MELLO (1979) and PASTORE (1979).
- 5/ To illustrate this point, ALVES & PASTORE (1978) quote figures which show that in 1964 the industrial sector accounted for 35% of the GNP (gross national product) while the share of employment was only 8%. This figure is far below the comparative employment share in other countries with similar economic conditions.
- 6/ Figures quoted from ALVES (1979) suggest that a proportion between 11.6 to 19.1% of the GNP was transferred from agriculture to the industry in the period 1958-60.
- 7/ According to SCHUH (1976) there is a secular decline in the real price of agricultural commodities, as a result of technical change and the development of the economy. In the case of the U.S. only in the early 70.s is that this secular trend ceased to exist. This trend is linked with low price and demand elasticities of agricultural commodities (See JOHNSON, 1972).
- 8/ Recent evidence indicates that land reform in itself is not likely to solve the problem (RICHTER and KONSEN, 1979).
- 9/ See SCHUH (1974).
- 10/ See PAIVA (1975). RYFF (1976) argued that this hypothesis might occur only under very specific circumstances.
- 11/ This is the main argument of HAYAMI and RUTTAN (1971), when they introduce the hypothesis of induced innovation.
- 12/ In 1970, 58% of the Brazilian exports came from the agricultural sector. If the primary sector as a whole is considered (including animal production and minerals) then this figure raises to 90% (MENDONÇA DE BARROS & GRAHAM, 1978).
- 13/ This section is based on HOMEM DE MELO (1979), MENDONÇA DE BARROS & GRAHAM (1978) and ALVES & PASTORE (1978).
- 14/ Export crops among 30 others are mainly coffee, cotton, sugarcane, soyabeans, cocoa and citrus.
- 15/ For example, in 1967 Brazil produced 715.000 tons of soyabeans. In 1977 the production of this crop reached 12.5 million tons. There is a regional component in this trend, as 70% of the marketed agricultural production comes from the south, south-east and central areas of Brazil.

- 16/ See ALVES (1979).  
 17/ See PASIORE et al. (1976) and PASTORE et al. (1974).  
 18/ With a budget of only US\$ 14 million, the former DINEA had no more than 10 percent of its researchers with graduate degrees. (PASTORE and ALVES, 1975).  
 19/ See DE ARAUJO and MEYER (1977).  
 20/ Eg. BARNARD & NIX (1973).  
 21/ See for example the "FARM MANAGEMENT POCKETBOOK" J. Nix (ed.), Wye College (University of London).  
 22/ See for example, Dr. Webster's Farm Management Game (Wye College - ENGLAND) and the SIMPLAN of the University of Giessen (Germany). EMBRAPA's package is based on the B-10 version of the Purdue Crop/Machinery Budget from the Purdue University (U.S.A.).  
 23/ See NIX (1977).

#### REFERENCES

- ALVES, E.R.A. (1979) "A Produtividade da Agricultura", EMBRAPA, Brasília.  
 ALVES, E.R.A. and A.C. PASTORE (1978) "Import Substitution and Implicit Taxation of Agriculture in Brazil" American Journal of Agricultural Economics, Vol. 60, no. 5, p.p. 865-871.  
 BARNARD, C.S. and J.S. NIX (1973) "Farm Planning and Control" Cambridge University Press, Cambridge.  
 DE ARAUJO, P.F.C. and R.L. MEYER (1977) "Agricultural Credit Policy in Brazil: Objectives and Results" American Journal of Agricultural Economics, vol. 59, no. 5, p.p. 957-961.  
 HAYAMI, Y. and V. TUTTAT (1971) "Agricultural Development: An International Perspective" John Hopkins Press, Baltimore.  
 HOMEM DE MELLO, F.B. (1979) "A Política Econômica e o Setor Agrícola no Período Pós-Guerra" Revista Brasileira de Economia, vol. 33, no. 1, p.p. 25-63.  
 HOMEM DE MELLO, F.B. and M.H. ZUCKER (1977) "Exportações Agrícolas, Balanço de Pagamento e Abastecimento do Mercado Interno" Estudos Econômicos, vol. 7, no. 2, p.p. 9-50.  
 JOHNSON, G.L. (1972) "Theoretical Considerations" in The Overproduction Trap in U.S. Agriculture: A Study of Resource Allocation, G.L. Johnson and C.L. Quancey (eds.) Ch. 3 - p.p. 22-40, John Hopkins Press, Baltimore.  
 LEWIS, W.A. (1954) "Economic Development with Unlimited Supplies of Labour" Manchester School Press.  
 MENDONÇA DE BARROS and D.H. GRAHAM (1978) "A Agricultura Brasileira e o Problema da Produção de Alimentos" Pesq. Plan. Econ., vol. 8, no. 3, p.p. 695-726.  
 NIX, J.S. (1977) "Farm Management-Identical Objectives Worldwide under Different Conditions" Paper presented to the 3rd. IFMC, Hamburg.  
 PAIVA, R.M. (1975) "Modernização e Dualismo Tecnológico na Agricultura" Pesq. Plan. Econ., vol. 5, no. 1.  
 PASTORE, A.C. (1979) "Exportações Agrícolas e Desenvolvimento Econômico" in A. Veiga (ed.) Ensaio sobre Política Agrícola Brasileira, IEA, São Paulo.  
 PASTORE, A.C., E.R.A ALVES and J.A.B. RIZZIERI (1974) "A Inovação Induzida e os Limites à Modernização na Agricultura Brasileira" Paper presented to the 13th. Congress of SOBER, Porto Alegre.  
 PASTORE, J., G. LEITE SILVA DIAS and M.C. DE CASTRO (1976) "Condicionantes da Produtividade da Pesquisa Agrícola no Brasil" Estudos Econômicos, vol. 6, no. 3, p.p. 147-182.  
 RICHTER, H.V. and O.G. KONSEN (1979) "Oferta Agrícola e Fatores Explicativos da Renda em Grandes e Pequenos Estabelecimentos Rurais" R. Econ. Rural, vol. 17, no. 3, p.p. 5-24.  
 RYFF, T.B. (1976) "A Difusão da Inovação Tecnológica na Agricultura: Mecanismos de Auto Controle versus Inovação Induzida" Rev. Bras. Econ., vol. 30, no. 3, p.p. 295-327.  
 SCHUH, G.E. (1976) "The New Macroeconomics of Agriculture" Amer. Journal Agr. Econ., vol. 58, no. 5, p.p. 802-811.  
 SCHUH, G.E. (1977) "A Política Cambial e o Desenvolvimento da Agricultura no Brasil" Paper presented at the 14 th. SOBER Conference in Vitoria - Brazil".  
 WEHRLE, R. (1977) "Brazilian Agriculture and its Development since 1950" Paper presented at the 3 rd. IFMC, Hamburg-Germany.



- 16/ See ALVES (1979).  
 17/ See PASIORE et al. (1976) and PASTORE et al. (1974).  
 18/ With a budget of only US\$ 14 million, the former DINEA had no more than 10 percent of its researchers with graduate degrees. (PASTORE and ALVES, 1975).  
 19/ See DE ARAUJO and MEYER (1977).  
 20/ Eg. BARNARD & NIX (1973).  
 21/ See for example the "FARM MANAGEMENT POCKETBOOK" J. Nix (ed.), Wye College (University of London).  
 22/ See for example, Dr. Webster's Farm Management Game (Wye College - ENGLAND) and the SIMPLAN of the University of Giessen (Germany). EMBRAPA's package is based on the B-10 version of the Purdue Crop/Machinery Budget from the Purdue University (U.S.A.).  
 23/ See NIX (1977).

#### REFERENCES

- ALVES, E.R.A. (1979) "A Produtividade da Agricultura", EMBRAPA, Brasília.  
 ALVES, E.R.A. and A.C. PASTORE (1978) "Import Substitution and Implicit Taxation of Agriculture in Brazil" American Journal of Agricultural Economics, Vol. 60, no. 5, p.p. 865-871.  
 BARNARD, C.S. and J.S. NIX (1973) "Farm Planning and Control" Cambridge University Press, Cambridge.  
 DE ARAUJO, P.F.C. and R.L. MEYER (1977) "Agricultural Credit Policy in Brazil: Objectives and Results" American Journal of Agricultural Economics, vol. 59, no. 5, p.p. 957-961.  
 HAYAMI, Y. and V. TUTTAT (1971) "Agricultural Development: An International Perspective" John Hopkins Press, Baltimore.  
 HOMEM DE MELLO, F.B. (1979) "A Política Econômica e o Setor Agrícola no Período Pós-Guerra" Revista Brasileira de Economia, vol. 33, no. 1, p.p. 25-63.  
 HOMEM DE MELLO, F.B. and M.H. ZUCKER (1977) "Exportações Agrícolas, Balanço de Pagamento e Abastecimento do Mercado Interno" Estudos Econômicos, vol. 7, no. 2, p.p. 9-50.  
 JOHNSON, G.L. (1972) "Theoretical Considerations" in The Overproduction Trap in U.S. Agriculture: A Study of Resource Allocation, G.L. Johnson and C.L. Quancey (eds.) Ch. 3 - p.p. 22-40, John Hopkins Press, Baltimore.  
 LEWIS, W.A. (1954) "Economic Development with Unlimited Supplies of Labour" Manchester School Press.  
 MENDONÇA DE BARROS and D.H. GRAHAM (1978) "A Agricultura Brasileira e o Problema da Produção de Alimentos" Pesq. Plan. Econ., vol. 8, no. 3, p.p. 695-726.  
 NIX, J.S. (1977) "Farm Management-Identical Objectives Worldwide under Different Conditions" Paper presented to the 3rd. IFMC, Hamburg.  
 PAIVA, R.M. (1975) "Modernização e Dualismo Tecnológico na Agricultura" Pesq. Plan. Econ., vol. 5, no. 1.  
 PASTORE, A.C. (1979) "Exportações Agrícolas e Desenvolvimento Econômico" in A. Veiga (ed.) Ensaio sobre Política Agrícola Brasileira, IEA, São Paulo.  
 PASTORE, A.C., E.R.A ALVES and J.A.B. RIZZIERI (1974) "A Inovação Induzida e os Limites à Modernização na Agricultura Brasileira" Paper presented to the 13th. Congress of SOBER, Porto Alegre.  
 PASTORE, J., G. LEITE SILVA DIAS and M.C. DE CASTRO (1976) "Condicionantes da Produtividade da Pesquisa Agrícola no Brasil" Estudos Econômicos, vol. 6, no. 3, p.p. 147-182.  
 RICHTER, H.V. and O.G. KONSEN (1979) "Oferta Agrícola e Fatores Explicativos da Renda em Grandes e Pequenos Estabelecimentos Rurais" R. Econ. Rural, vol. 17, no. 3, p.p. 5-24.  
 RYFF, T.B. (1976) "A Difusão da Inovação Tecnológica na Agricultura: Mecanismos de Auto Controle versus Inovação Induzida" Rev. Bras. Econ., vol. 30, no. 3, p.p. 295-327.  
 SCHUH, G.E. (1976) "The New Macroeconomics of Agriculture" Amer. Journal Agr. Econ., vol. 58, no. 5, p.p. 802-811.  
 SCHUH, G.E. (1977) "A Política Cambial e o Desenvolvimento da Agricultura no Brasil" Paper presented at the 14 th. SOBER Conference in Vitoria - Brazil".  
 WEHRLE, R. (1977) "Brazilian Agriculture and its Development since 1950" Paper presented at the 3 rd. IFMC, Hamburg-Germany.