

DEVELOPING AN AGRICULTURAL CURRICULUM
MODEL FOR RURAL SCHOOLS
IN NORTHEAST BRAZIL

By

MARIA GORETTI SERPA BRAGA

Bachelor of Science in Economics
Ceará Federal University
Fortaleza, Ceará, Brazil
1975

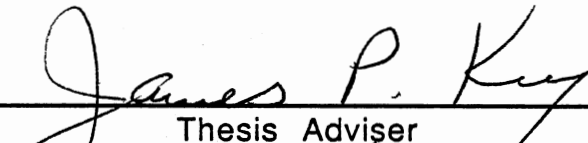
Master of Science
Paraíba Federal University
Campina Grande, Paraíba, Brazil
1985

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF EDUCATION
December, 1988

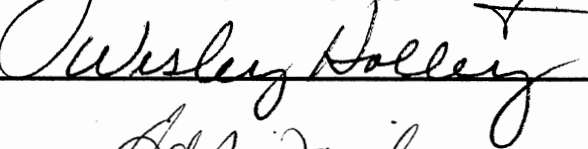
Thesis
1988D
B813d
cop. 2

DEVELOPING AN AGRICULTURAL CURRICULUM
MODEL FOR RURAL SCHOOLS
IN NORTHEAST BRAZIL

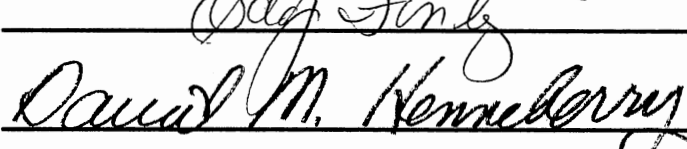
Thesis Approved:



Thesis Adviser



Edg. Dir.



Norman N. Durham

Dean of the Graduate College

ACKNOWLEDGMENTS

The author wishes to express her profound gratitude appreciation to Dr. James P. Key, the author's advisory committee chairman for his guidance, advice, understanding, encouragement, patience, friendship, and cooperation during the conduct of this study and the graduate program. Sincere appreciation is expressed to Dr. Wesley Holley, Dr. Edward Finley, and Dr. Dave Henneberry, my committee members, for their great and valuable help. A special thanks is given to Dr. Robert Terry, Head of the Department of Agriculture Education for providing material and physical conditions to be used during my doctoral program. Sincere appreciation is extended to Miss Debbie White and Mrs. Anita Montgomery, secretaries of the Department of Agricultural Education for their enormous contributions. A great appreciation is expressed to my graduate colleague and friend David Gallatin for his big help during the graduate program.

Great appreciation is extended to Paraiba Federal University in Brazil for giving permission in conducting this study at Oklahoma State University, and to Dr. Ramon Peña Castro, my professor and former advisor in Brazil for his continuous encouragement and friendship.

Sincere appreciation is expressed to Brazilian Agriculture Research Corporation (EMBRAPA) for its financial support the graduate program and for this study.

Many thanks to the Brazilian graduate students who answered the questionnaire for their extremely important cooperation and the international

graduate AGED/OSU students who sent agriculture curricula for their great cooperation.

Sincere appreciation is extended to my good friends, John and Ingrid Witt, and Haidee Anziani for their caring and sharing; Joe and Anne Zinn, Mike and Pat Rose, and Nete Johnson for their friendship; and Mrs. Betty Harris for her continuous happiness in helping people and who patiently typed this study.

Personal appreciation is extended to each member of my family for their love, enthusiasm, support, encouragement, especially my parents, José Oriá and Maria Alice. Profound gratitude is expressed to my youngest sister Ana Alice for her dedication to my children during the beginning of our lives in the United States.

The greatest thanks and appreciation goes to my husband Raimundo for his love, continuous encouragement and help, his positive attitudes, and caring about his wife's success, and to my daughters Ana Cecilia and Alice who are too young to understand why their mother did not have so much time to play with them. Sharing our worrying and loving each other, we have done this study.

I dedicate this work to my father whose love, dedication, courage, and force guided me to complete it. It was almost done, but he could not know its results. I thank you so very much Dad.

TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	1
Problem Statement.....	2
Purpose of the Study.....	2
Objectives of the Study.....	2
Basic Assumptions of the Study.....	3
Scope and Limitations.....	3
Background Situation	3
Northeast Brazil.....	6
Definition of Terms.....	9
II. REVIEW OF LITERATURE.....	11
Introduction	11
Education and Rural Development	11
Agriculture Education: Some Countries Experience	13
Human Capital and Investment.....	15
Education and Investment in Brazil.....	16
An Overview of the Brazilian Educational System.....	19
An Overview of Selected Available Studies Related to Curriculum Concepts.....	22
An Overview of Selected Available Studies Related to Curriculum Development.....	24
The Content of Curriculum.....	27
Summary.....	27
III. DESIGN AND METHODOLOGY.....	30
Introduction	30
First Objective.....	30
Second Objective	31
Third Objective	31
Population of the Survey.....	32
Development of the Instrument.....	32
Collection of Data.....	33
Analysis of the Data.....	34

Chapter	Page
IV. FINDINGS FROM CURRICULUM MATERIALS	35
Introduction	35
First Objective	35
Developed Country Materials.....	35
Developing Country Materials.....	38
Eastern Carolina Islands - Federal State of Micronesia.....	39
Thailand.....	39
Republic of China (Taiwan)	40
Philippines	40
Nigeria	40
Selected Graduate AGED/OSU Studies.....	41
Second Objective	43
V. PRESENTATION AND ANALYSIS OF SURVEY DATA.....	46
Introduction	46
Background of the Respondents.....	46
The Agricultural Curriculum Model for Elementary Schools	49
Plant and Soil Science.....	49
Nutrition and Health	54
Animal Science	54
Agricultural Mechanics	58
Farm Management	58
Leadership.....	58
Overall Importance of the Curriculum for Elementary Schools.....	62
Agricultural Curriculum Model for Secondary Schools.....	62
Plant and Soil Science.....	62
Animal Science.....	62
Agricultural Mechanics	66
Farm Management	66
Leadership.....	69
Overall Importance of the Curriculum for Secondary Schools.....	69
VI. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	72
Summary of the Study	72
Purpose of the Study.....	72
Objectives of the Study	72
Summary of Review of Literature.....	73
Design and Methodology of the Study	74
Findings from Curriculum Materials	75
Developed Countries.....	75
Developing Countries.....	76

Chapter	Page
Eastern Caroline Islands - Federal State of Micronesia.....	76
Republic of China (Taiwan)	77
Philippines	77
Nigeria	77
Brazil	78
Graduate AGED/OSU Studies	78
Findings from the Survey Data.....	79
The Agricultural Curriculum Model for Elementary Schools	80
The Agricultural Curriculum Model for Secondary Schools	80
Conclusions.....	80
Recommendations.....	82
SELECTED BIBLIOGRAPHY.....	84
APPENDICES	88
APPENDIX A - (LETTER TO FORMER INTERNATIONAL AGED/OSU GRADUATE STUDENTS)	89
APPENDIX B - (LETTER TO TECHNICAL AGRICULTURE SCHOOLS IN NORTHEAST BRAZIL)	91
APPENDIX C - (LETTER TO NATIONAL TECHNICAL AGRICULTURE SCHOOLS COORDINATION IN BRAZIL.....	93
APPENDIX D - (LETTER TO CNPq AND EMBRAPA).....	95
APPENDIX E - (QUESTIONNAIRE).....	97
APPENDIX F - (COVER LETTER).....	103
APPENDIX G - (FOLLOW-UP LETTER).....	105
APPENDIX H - (COMMENTS AND SUGGESTIONS OF THE RESPONDENTS).....	107

LIST OF TABLES

Table	Page
I. Formal Educational Systems in Brazil.....	19
II. Scale for the Agricultural Curriculum Model in the Questionnaire.....	33
III. Summary of Plant and Soil Science Area for the Elementary Curriculum Model.....	55
IV. Summary of Nutrition and Health Area for the Elementary Curriculum Model.....	56
V. Summary of Animal Science Area for the Elementary Curriculum Model.....	57
VI. Summary of Agricultural Mechanics Area for the Elementary Curriculum Model.....	59
VII. Summary of Farm Management Area for the Elementary Curriculum Model.....	60
VIII. Summary of Leadership Area for the Elementary Curriculum] Model.....	61
IX. Summary of Plant and Soil Science for the Secondary Curriculum Model.....	64
X. Summary of Animal Science for the Secondary Curriculum Model.....	65
XI. Summary of Agricultural Mechanics Area for the Secondary Curriculum Model.....	67
XII. Summary of Farm Management for the Secondary Curriculum Model.....	68
XIII. Summary of Leadership Area for the Secondary Model.....	70

LIST OF FIGURES

Figure	Page
1. Age of the Respondents Histogram.....	47
2. Sex of the Respondents Histogram.....	48
3. Majors of the Respondents Histogram.....	50
4. Degree of the Respondents Histogram	51
5. Birth Place of the Respondents Histogram	52
6. Years of Involvement in Agriculture of the Respondents Histogram.....	53
7. Importance Level of the Areas for the Elementary Curriculum Model	63
8. Importance Level of the Areas for the Secondary Curriculum Model	71

CHAPTER I

INTRODUCTION

According to Kutcher and Scandizzo (1981), Northeast Brazil has been a source of embarrassment to Brazilians for over a century. It is the poorest area in the country, accounting for 30 percent of Brazil's population, and having one-third of the total national per capita income.

Brazil's illiterate population (persons who are 10 years old or more) reached 22 million in 1980, and more than half lived in the Northeast. Only 9.8 percent of the Northeast population had elementary level or basic education. IBGE (Census 1980). Absolute poverty reached 20 million of the total Northeast population, and this concept underestimates the real dimension of poverty, because it only includes those people that live with less than a minimum wage. IBGE (Census 1980).

Since 1960 the rural population has moved to urban areas at a very high rate, but this population has not been integrated in the 'city system'. They do not have access to the job markets. They are not skilled to do the jobs available in the cities. Therefore, these rural migrants become marginalized and contribute to increasing the level of unemployment, problems of health, sanitation, crime, crowding and morality in the urban sector.

Some of these problems could be alleviated with a government decision to increase investment in rural people through educational programs. Northeast Brazil is an agricultural region still using 'old methods' for production. Here millions of people are not integrated in Brazilian development, and the

education system needs to be re-organized and re-oriented for rural people and for promoting rural development.

Problem Statement

Promoting rural development requires increasing the well being of rural people. This implies a better quality of life which can be achieved through education. Agricultural Education is the key to promoting rural development because it is a legitimate component of agricultural development. The rural areas in Northeast Brazil need to accelerate the development process through re-organized and re-oriented school curriculum to define their real needs.

Purpose of the Study

The major purpose of this study was to develop an agricultural curriculum model. The secondary purpose was to verify the importance of this model for rural schools in Northeast Brazil.

Objectives of the Study

In order to achieve the purposes the following objectives must be met: 1. To examine agricultural curriculum materials from developing and developed countries and verify how these could be applied in Northeast Brazil. 2. Contact Technical Agriculture schools in Northeast Brazil for their curriculum and recommendations. 3. To obtain the judgement of a Brazilian graduate student group majoring in agriculture in United States universities as to the importance of the model for rural schools in Northeast Brazil. These students had either a scholarship from Brazilian Agriculture Research Corporation (EMBRAPA) or the National Research Institute (CNPq) during the development of the study.

Basic Assumptions of the Study

The following assumptions were made regarding the study.

1. The participants in this study were aware of the socio-economic and agricultural situations in Northeast Brazil.
2. The participants were familiar with the curriculum in rural schools in Northeast Brazil.
3. The participants answered the questionnaire honestly using their best knowledge.
4. Agricultural Education is the key element to promote rural development.
5. Investment in human capital contributes to alleviate poverty-food-population problems in developing areas.

Scope and Limitations

Data for this study were obtained by a mailed questionnaire. Because of the difficulties of conducting the survey in Brazil, the population of this study was a Brazilian graduate student group majoring in agriculture at the United States universities. As EMBRAPA is the major agriculture research corporation in Brazil and CNPq is the most important center sending students abroad, the graduate students were chosen from those institutions.

Background Situation

Brazil is the fifth largest country of the world and its 3.3 million square miles occupy nearly half the area of South American. With over 138 million people, Brazil is the world's seventh most populous country.

According to National Geographic (1987) Brazil's economy is formed as follows: agriculture, 13 percent of gross domestic product; industry 35 percent; services 52 percent. Its per capita income is \$1,710.

Robock (1975) said that much of Brazil's resource potential is still unknown, and resource surveys require large investment, principally, in countries like Brazil. He said "Brazil's resource endowment has both riches and serious deficiencies." (p. 8). Brazil is a world leader in iron ore, National Geographic (1987). Manganese is Brazil's second most important mineral product. Other minerals according to Robock (1975) found in significant quantities include tin, copper, lead, zinc, nickel ore, phosphate rock, gypsum, thorium, quartz crystal, gem stones, industrial diamonds, graphite, chromium, tungsten, and gold. Brazil's hydroelectric potential is among the largest in the world, estimated at about 150,000 megawatts of which only small fraction (about 7 percent) has been utilized.

Of Brazil's 279 million hectares of arable land, 88 million are unexploited and much of the remainder is exploited only limitedly. Thus, Brazil probably has the largest still unused accessible fertile land area in the world Robock (1975).

The gap between rich and poor, educated and ignorant, has widened to serious dimensions in Brazil. Concentration of land is one example. Eighty percent of the land is held by only 5 percent of the people. Twenty million Brazilians labor at a minimum wage of less than \$60 a month. Out of 138 million inhabitants of Brazil "only a small group is living in this century and this time", Antonio Callads cited by National Geographic (1987, p. 352).

The government has offered little to the poor people. They have been searching for a better life in the past half century resulting a migration of people. In 1940 the urban population represented 31.2 percent and rural population

represented 68.8 percent Alves (1984). In 1980 urban population reached 67.0 percent and rural 33.0 percent IBGE (1984).

"The peasants who worked the plantations of Northeast Brazil gradually found themselves captive to an exhausted land. In the past 40 years, 3.5 million of them have fled" National Geographic (1987, p. 358). But, for those who decide to stay in the interior (Sertão), the situation is precarious. They are mired in one of the most poverty-stricken areas in the western hemisphere. Most are malnourished, half are illiterate.

Brazilian construction, engineering and business are around the world. China buys Brazilian computers, Nigeria requests Brazilian engineers, the United States people wear Brazilian shoes, and Europe can watch soap operas imported from TV Globe, the world's fourth largest television network. Brazil is the fifth largest exporter of arms in the world. And Brazil was the only country to change successfully from gasoline to alcohol for automobile fuel at the oil crisis. "More than 90 percent of new Brazilian made cars use it." National Geographic (1987, p. 369).

Now Brazil is the world's second largest exporter of agricultural products. But, the nation fundamental problem in 1987 was: how to feed its own people. Sugarcane for ethanol and export crops such as soybeans that help pay the foreign debt have taken the place of traditional food crops like beans and corn.

"Farm workers have lost their subsistence gardens as owners have pushed the newly profitable crops to the far edges of their properties. Mechanization has deprived other thousands of a living. Many people whose families have farmed the same land for generations have been forced out." National Geographic (1987, p. 369).

As an extremely large country, Brazil has significant regional differences in levels of social and economic welfare, in rates of growth and in the structure of

economic activity. Brazil is divided in five regions considering their physical, human, economic and social aspects; Amazon, Northeast, Central-West, Southern and South.

As this study is related to the Northeast Region, some aspects of it were explained in the next subsection.

Northeast Brazil

Northeast Brazil embraces the following nine states: Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe and Bahia, and the Territory of Fernando de Noronha. This region represents 18.2 percent of Brazil's total area and 30.0 percent of Brazil's total population. If Northeast were a separate nation, it would rank second in population and third in area within South America. In area, the Northeast is larger than Italy, Spain and Portugal combined. Robock (1968). The Brazilian northeast is also the poorest area of Brazil.

Robock (1975) said that: as the largest area of poverty in South America and known internationally for its periodic droughts, this part of the country is so often referred to by journalists and other writers as the 'drought-stricken Northeast' that many people have come to accept this cliché as the official name of the region (p. 78).

The Northeast was the earliest settled part of the country and among the first areas in the 'New World' to be colonized. In 1532, sugarcane production began there. The region became one of the most important sugar producing areas of the world. In the last half of the seventeenth century, the sugar prices fell sharply because of the Caribbean development of sugar industry. The decrease of the prices continued during the next century. Consequently, the era of Northeast prosperity based upon a sugar and slave plantation economy

came to an end. Later on cotton agriculture became important, but the region never reached its position of economic leadership in the country. Gold, rubber, and coffee became Brazil's principal products during subsequent periods, and the economic frontier and the center of economic quantity of the country migrated with change in leading commodities Robock (1968) and Robock (1975).

With the problems in sugar success the expanding Northeast population changed in a great number to the semiarid interior where cattle raising and subsistence agriculture became the most important economic activities. The rapid shifting of population and "economic activity from the humid coastal areas to the semiarid interior made the periodic droughts that hit the interior increasingly calamitous" Robock (1975, p. 78).

Since a century ago, Brazil's federal government has been trying to solve the Northeast seca (drought) problems. Some programs and institutions have been established. The special federal programs currently operating are BNB- Banco do Nordeste do Brasil (Bank of Northeast Brazil), which is a regional development bank and one of the major development bank in Brazil created in 1952; The SUDENE - Superintendência do Desenvolvimento do Nordeste, which is a regional development agency that has administered a powerful attractive tax incentive program resulting in an industrial rejuvenation of the region, and CHESF - Companhia Hidroelétrica do São Francisco, which is a successful regional power company and has supported the growth and modernization of the Northeast, Robock (1975).

Agriculture and cattle raising, both operating at low technologies levels, has been the major economic activities of the region. The principal crops are sugar cane, cacao in Bahia, long-fiber cotton, manioc, beans, corn, and a variety of extractive products such as babaçu nuts for tropical oils and carnauba

wax. The traditional industrial sector has been textiles and food processing, but the new wave of industrialization has included steel, chemicals, machinery, and consumer durables as products of the diversified manufacturing activity Robock (1975).

Even with the establishment of the federal programs and institutions as SUDENE and BNB to promote Northeast development, the region is still so far behind. Northeast per capita income is about one-third of Brazil per capita income. Productivity is low, food is scarce. Most of the Northeast population is malnourished and half is illiterate. In rural areas, the per capita income is even much lower. Although data are not available on the distribution of income among the individuals in the rural sectors, it is quite likely that a small number of plantation owners receive a high share of the total rural income and the bulk of the sharecroppers, farm workers and operators of small minifundio holding receive extremely below the average for the rural sector Robock (1968).

Robock (1968) pointed out four basic factors of special importance in explaining the rural poverty in Northeast Brazil and the pressures for rural immigration:

1. The physical resource endowment of the Northeast, particularly the soils, is not outstanding.
2. Traditionally, the Northeast has never made substantial investments in its richest resources -- its people.
3. A serious imbalance exists between the physical resources available for agriculture and the labor force in rural areas.
4. Agricultural productivity is extremely low because of the serious lags in adopting technological innovations as well as to physical and human resource limitations. (p. 7)

The four basic factors are direct or indirectly related to the human capital formation. Integrating Northeast region and its rural people within the development of Brazil is the task that Brazilian government must accomplish. This commitment requires investment. Investment in its people through an agricultural education program to promote rural development alleviating poverty and food problems to the 35 million of people that live in Northeast Brazil.

Definition of Terms

Agricultural Education: It is teaching and learning about agriculture and other skills that are related to agriculture, for a better understanding, appreciation and training in agriculture fields.

Northeast Brazil: This region is composed by the following states: Bahia, Sergipe, Alagoas, Pernambuco, Paraíba, Rio Grande do Norte, Ceará, Piauí and Maranhão, and Fernando de Noronha Territory, representing 18.2 percent of Brazil's total area and about 30 percent of Brazilian population.

Rural Development: FAO (1977), it is a development that requires the existence of factors which deal with changes that improve the condition and quality of life of the population within a determined community.

Curriculum: As used in this study refers to the courses that are offered by an educational system for rural areas.

Rural Areas: In this study rural areas refer to the "Microrregiões Homogeneas." Microrregiões Homogeneas are areas that aggregate into the same state, "Municípios" with homogeneous conditions such as economics, social and physical and that have the agriculture as a major economy activity.

AGED/OSU: Agricultural Education Department at Oklahoma State University.

Rural Village: Collection of houses and other buildings in a country area, smaller than a town.

Small Town: Small group of houses and other buildings where people live and work.

City: Town of the 'Município'. It is represented by a higher density of the population. It centralizes most of the business, educational, and financial affairs.

Metropolis: There are 9 metropolitan regions in Brazil where predominant activities related to industry and services. Each region has a 'city' that concentrate the most of those activities and it is called metropolis. The 9 metropolis in Brazil are: Belém, Fortaleza, Recife, Salvador, Belo Horizonte, Rio de Janeiro, São Paulo, Curitiba, and Porto Alegre.

CHAPTER II

REVIEW OF LITERATURE

Introduction

In this chapter the following sections were presented.

1. Education and Rural Development
2. Agricultural Education: Some countries experience
3. Human Capital and Investment
4. Education and Investment in Brazil
5. An Overview of Brazilian Educational System
6. An Overview of Selected Available Studies Related to Curriculum Concepts
7. An Overview of Selected Available Studies and Research Related to Curriculum Development
8. The Content of Curriculum
9. Summary

Education and Rural Development

Rural development requires the existence of factors which deal with changes that improve the condition and quality of life of the population within a determined community, FAO (1977).

Studies from FAO (1977) said that for appreciating the educational problems in rural development, it must be included within the overall context of the high level problems of world food supply and population growth. They also

added that "the rural poor are becoming increasingly marginalized in the course of the development and their absolute numbers are increasing," (p. 2). They advise that effective measures need to be done quickly, in order to decrease the gap between the rich and the poor countries, decrease the gap between the 'haves' and the 'have nots' in the developing nations, and avoid serious disturbances of dangerous proportions in these countries. They said that development strategies must consider the employment creation through an education system which helps prepare for employment diversification and the possibility of obtaining satisfactory income levels.

FAO (1977) presented that education is only high-yielding when three conditions are applied: "when it is the right-kind of education to fit the real needs of the particular situation; when it is provided with reasonable efficiency and effectiveness; and when the essential environmental preconditions and complementary components are present to ensure effective utilization of the educational results," (p. 6). It concluded that the educational system around the world has a low productivity if it is judged by these conditions.

Berstecher (1985) said that education plays an important role as a change and major dynamic force for rural development, but unfortunately it has been unable to live up to its supposed role. He added that "Formal school systems in developing countries, dissociating from the realities of rural life have expanded massively and taken up ever increasing shares of national resources," (p. 47). But, their quality has remained poor and their contribution to rural development still questionable. He also mentioned that the curricula and structure are directed using colonial models, ignoring the real learning needs of the rural poor.

The curricula dissociated from rural peoples' real needs was one of the causes pointed out by Apeid (1986) of educational underdevelopment in rural

areas. This study mentioned nine causes that are responsible for nonimprovement of education in rural areas. 1 - Poverty; 2 - Transportation and communication factors; 3 - Population explosion; 4 - Language difficulties; 5 - Inadequate emphasis on rural policy, planning, and management; 6 - Inadequate provision of education services because of the disparities in educational opportunities and the inefficient/inadequate physical facilities and materials; 7 - Irrelevance of the curriculum to the rural situation and needs; 8 - Low quality of teaching; and 9 - Lack of parental or community support.

The level of education and the way farmers managed their farms in developing nations were related, as showed Jamison and Lau cited by Imbia (1987). Leonard cited by Imbia (1987) noted that those farmers who knew how to read and write were more acceptive in using new techniques than those without any type of training.

Kouzekanani and Miller (1985) said that the rural third world people need to be educated in order to raise their level of consciousness, break away from traditional fatalism and transform their world. They concluded that the agricultural extension educators could play an important role in achieving a noble task like that.

Agricultural Education: Some Countries Experience

Birkenholz (1986) said that the need to provide learning experiences for each individual student is very important in achieving educational objectives. He added that learning experience in agricultural education orders means as well as ends of education. He explained that means focus on providing adequate learning experiences whereas ends requires the general growth and maturation of each student as an individual. Education is a process without

end, and learning experiences bring consequences which give rise to additional learning opportunities in a responsive way.

With this philosophy agricultural education has been an important role in promoting rural development around the world.

Swanson (1985) said that agricultural development in North America and Europe have received an important contribution through agricultural and extension education. In the United States, vocational agriculture programs in schools prepared with technical and managerial skills what rural young people required to succeed in farming and more recently in agribusiness. "Agricultural extension built on this educational foundation farmers needed to increase production and farm incomes," (p. 3).

Meaders (1985) pointed out that Japan and Taiwan are keeping agriculture powerful including agricultural education in their plans. He said that vocational education in agriculture is included in the public educational system in Japan." The six years of elementary and three years of lower secondary school education are compulsory for children between ages six and fourteen," (p. 10). In the upper secondary level schools, agriculture is taught as a vocational subject. About 230 separate agricultural schools were in Japan in 1980.

In Taiwan, Meaders (1985) said that "the introducing of agriculture into the rural primary schools in the early 1900's was followed by an emphasis on vocational education starting around 1918-1919," (p. 11).

Agricultural education in Taiwan remains a strong, integral part of the educational system.

Meaders (1985) said that the vocational agriculture programs serve students both rural and urban areas in Japan and Taiwan. In both countries,

agricultural education programs are integral parts of their 'extensive educational system', (p. 11).

Morton and Tansan (1985) showed Cameroon and Swaziland experiences with agricultural education. Educational programs in these countries "emphasize practical education in agriculture that includes allocative and technical competencies in the local curriculum," (p. 13). Both countries "are good examples of what can be done to inspire and educate rural youth to seek and be successful in farming careers," (p. 13). Evaluations made in 1982 for Swaziland programs concluded "that schools agriculture was unique and should be adapted by other African countries," (p. 14).

Human Capital and Investment

Deaton and McNamara (1984) studying different sources of available research concluded that investment in human capital is a "fundamental tool" for alleviating poverty, promoting citizenship, and changing those institutional structures that block the improving of the standards of living.

Schuh (1981) presented four reasons for investing in human capital. First, improving the qualities of the human agent contributes to labor productivity and to allocative and entrepreneurial ability. Second, the development of any society requires changes, those changes require new skills increasing allocative and entrepreneurial abilities. Those skills and abilities required can be improved only by training or formal schooling. Third, "human capital involves a number of important complementarities. Human and physical capital are complementary," (p. 53). Human capital is also complementary to new production technology, which is the sine qua non condition of development. Making correct and full use of this technology, people must acquire new skills

through formal schooling and training. He also presented the various forms of human capital that are complementary to each other as nutrition and health. He said:

Not only does nutrition affect health; health can influence nutrition. And together, as we have noted, both affect the payoff to investment in schooling by determining the capacity of the person to learn. Health and nutrition also have long-term effects on the payoff to investment in training and formal schooling. Well nourished people in good health are less likely to be ill and better able to resist disease if they do contract it (p. 53).

The fourth reason is related with increasing people's skills and its immediate consequence in raising household and/or market productivity. He pointed out that the population control must be a concern in any investment in human capital.

Education and Investment in Brazil

Haussman and Haar (1978) showed studies made by Fundacao Getulio Vargas that too little money was being invested in Brazilian education and the economic growth could be accelerated simply by making transference of part of the funds used to capital accumulation through a faster accumulation of human capital.

Schuh (1970) said that Brazil is still investing in its rural people at a relatively low rate. He mentioned that formal educational achievement of the rural people is far below that of the urban sector, and the urban sector itself does not carry out with high marks. Extension type activities have begun, but only a small portion of the total farmers have been reached and vocational training is minimal. This low investment in people brings pervasive consequences where little innovative activity takes place among a large

proportion of the rural population, and minimal effort is made to accept and adopt new technologies. Thus, the agricultural development can not be done.

He also called attention to the need of improving and increasing investment in human capital for Brazil to achieve a self-sustaining rate of economic growth. He added the basic of the progress is knowledge, and the utilization of knowledge requires a highly trained labor force. The high rate in education has been well documented, as has the contribution of education for obtaining high rates of growth in other countries. "Brazil can not afford not to make these investments," (p. 423).

Other studies pointed out the importance of investing in human capital and the relationship it has with income and employment. Hewlett and Weinert (1982) showed that urban income in Brazil grew faster than did rural income; and they said "Those with a university education increased their income four times as fast as those with little or no education," (p. 321).

According to several studies that were presented above, Brazil presents most of these causes which are barriers to improve the quality of life of the rural people and to promote rural development.

Brown (1984) showed the wrong notion that was alluded to the potential of Brazil and particularly of the Amazon Basin as a source of food for the world. He said that "Brazil's Northeast still contains one of the largest areas of abject poverty, hunger and malnutrition found anywhere in the world," (p. 14). He pointed out that Brazil's population grows at nearly 3 percent per year, and to feed its population it should increase food needs by some 4 percent per year. But, for achieving this goal, Brazil needs to make heavy continuing investment in agriculture, which requires rapid innovation in the agricultural sector, consequently the development of new technologies, and their diffusion and acceptance by farmers. He said that because the nation has an agricultural

research system that is underdeveloped and underfinanced, a rural population still partly illiterate, and a high concentration of land among a small percentage of the population, the problems are evident. Besides these problems, Brazil has a high level of population increase, and Brown said "without a strong commitment to family planning, Brazil is not likely to be a major supplier of grain to the world," (p. 14).

Another pervasive consequence is the rural-urban migration in Brazil. Schuh (1970), Alves, Teixeira Filho, and Tollini (1985), Spitzer (1981) and Silva (1982) mentioned that the rural migrants arrive in the urban labor markets without skills for alternative employment, increasing the level of unemployment in the urban sector, and also increasing problems of health, sanitation, crime and morality.

To alleviate those problems, schooling and training should be provided in rural areas rather than when the migrants arrive in the city. Schuh (1970) presented two reasons for this: 1. it can be provided at an early age, when the opportunity costs to the trainee or student are relatively low; and 2. it will increase the productivity of the labor that does remain in rural areas, (p. 65).

Studies conducted by Alves, Teixeira Filho, and Tollini (1984) showed that Brazilian government needs deal with two other population characteristics rather than its fast growth and its concentration in specific areas. These characteristics are the age composition of the population and its level of education. Fifty-three percent of the population, aged 15 to 60, making up 92 percent of the labor force is illiterate. This group and those with elementary schooling add up to 55 percent of the labor force. Only 2.5 percent of the workers have college educations. For the rural sector the situation is even worse. Ninety-nine percent of the rural labor force is illiterate or has only an elementary school education.

An Overview of the Brazilian Educational System

This section focuses mainly on the primary and secondary levels.

According to Schuh (1970), Brazil as a country has not recognized the importance that education or improvements in the quality of its people can make to attaining a more rapid rate of economic growth. He showed that deficiencies are presented by the level of investment in its population and by the kind of education provided. He pointed out that greater emphasis has been given to law, medicine, and the letters, and relatively less to science and technology. Schuh (1970) said that the education level achievement by the total society has been quite low. Besides this, there has been a tremendous gap between the rural and urban sectors, "with rural people coming off much worse," (p. 188).

Brazilian formal education has been heavily influenced by European traditions with a strong emphasis on professional orientation and little emphasis on technology, science, or the preparation of students for a modern society. Schuh (1970) said that even though some changes have occurred in recent years, the past tradition is still quite strong. The formal educational in Brazil is:

TABLE I
FORMAL EDUCATIONAL SYSTEMS IN BRAZIL

LEVEL	INGRESSING	PERIOD
First	At least 7 years of age	8 years
Second	First level must be completed	3 years
Third (University)	Second level needs to be completed plus passing an entrance examination (vestibular)	4 or 5 years
Adapted from Schuh (1970; p. 188)		

This formal educational structure has historically been the route for entering the universities. However, vocational schools at the second level have been preparing students for work experience and they are basically commercial schools, normal schools, and agro-tecnico schools.

Even though the first level schooling is obligatory by law, starting at seven years of age, schooling is by no means universal.

McNeil (1970) pointed out that:

One feature of the aristocratic tradition inherited by Brazilian education reformers was the firmly established idea that proficiency in verbal skills should be the one criterion for selection of students at any level. Still perpetuated to some extent, this condition has caused the elimination of children who do not immediately succeed as early as the first grade, (p. 6).

Studies conducted by the Ministry of the Education and Culture in 1982 presented that 22.2 million students were enrolled at the first level (from the first grade to the eighth grade) and only 2.8 million were enrolled at the second level. Therefore, more than 19 million children have not been able to complete the first level.

In 1983, the Ministry recognized that out of a thousand children enrolled at the first grade, only 170 had completed their fundamental education.

The selective characteristics of Brazilian education mainly in entering the university is described by Schuh (1970) as a traumatic experience in the lives of many children. The competition is very keen because the number of potential entrants is much greater than the number of vacancies.

Brazil has been improving its educational system, but much more needs to be done, especially in rural areas. McNeil (1970) said that attempts to expand the system have been directed mainly to the cities and the "extensive and scarcely populated areas have not received the same amount of attention. As a

consequence, in 1964, 72 percent of the children not in school lived in rural areas," (p. 11).

Schuh (1970) pointed out that the magnitude of the problem could be presented in the case of Northeast, where only 37 percent of the rural age group 7-10 were enrolled in schools in 1964. The difference in the quality of schooling between rural and urban areas makes the gap between the two sectors even greater.

IBGE (1984) presented that 64 percent of the illiterate people in Brazil were in rural areas in 1970. In 1980, the situation presented some improvement in which 52 percent of illiterates were in that area. In 1983, 72 percent of the population at five years of age and more were living in urban areas. From this population, 79.3 percent were literate people. On the other hand, 28 percent of the population with those characteristics were living in rural areas, and 48 percent of them were illiterate.

This picture was even worse in the Northeast region in 1983, where 45 percent of the population at five years of age and more were in rural areas, and 65 percent of them knew neither how to read nor write. About 50 percent of Brazilian illiteracy was in the Northeast in 1983.

Secondary schools in rural areas is another serious problem. Rural people either do not have schools available, or they have to travel to the urban centers to obtain it.

McNeil (1970) showed that Brazil had a shortage of trained agricultural workers, to which no solution has been found. She said that in many areas production was small and expensive, and undernourishment was a permanent condition.

The situation still persists. Alves (1984) recommended that primary school programs must be revised to include courses on agricultural practices and the

quality of school in preparing skilled workers must be a concern of the government in promoting rural development.

An Overview of Selected Available Studies Related to Curriculum Concepts

There is not an agreement among curriculum authorities related to curriculum concept. It varies according to the time, to the changing society and to the expert's perceptions.

Taba (1962) defined curriculum as "a plan for learning," (p. 10).

Berman (1968) said that a conceptualization of the curriculum must involve several components:

First, it must be based upon an adequate view of man - a conception that is broad enough to account for a wide range of behaviors. Second, the curriculum should provide among its activities those which are designed to give children and youth the opportunity to develop the competencies designed in the view of man. Third, the curriculum must establish its points of emphasis or priorities. (p. 2).

He also pointed out that those ingredients need to be emphasized, if not the curriculum becomes bland and does not contribute for means of dealing with problems of conflicting interests.

Stenhouse (1975) correlated principles and features with educational proposal within his curriculum definition. He said that:

"A curriculum is an attempt to communicate the essential principles and features of an educational proposal in such a form that it is open to critical scrutiny and capable of effective translation into practice," (p. 4).

He added that as a minimum, a curriculum should give a basis for planning a course, studying it through observation and experiment, and considering the reasons of its justification.

After studying several definitions of curriculum Tanner and Tanner (1975) presented seven different approaches related to curriculum definition;

- 1) the cumulative tradition of knowledge,
- 2) modes of thought,
- 3) race experience,
- 4) guided experience,
- 5) a plan for learning,
- 6) educational ends and outcomes, and
- 7) a production system, (p. 43).

They pointed out that each definition expresses a particular approach and fail to provide the whole meaning of curriculum.

Tanner and Tanner (1975) also called attention to the changes in curriculum conceptions. They said that:

Changes in the nature of knowledge, changes in conceptions of the learner and the learning process, changes in social conditions, and the widening expectations of the role of the school in society have resulted in changing conceptions of curriculum, (p. 45).

Because of those changes Tanner and Tanner (1975) presented a tentative definition of curriculum. In their perspective curriculum is:

The planned and guided learning experiences and intended learning outcomes, formulated through the systematic reconstruction of knowledge and experience, under the auspices of the school for the learner's continuous and willful growth in personal-social competence, (p. 45).

Doll (1982) considered three key elements in his definition: knowledge, skills and attitudes. He said that:

The curriculum of a school is the formal and informal content and process by which learners gain knowledge and understanding, develop skills, and alter attitudes, appreciations, and values under the auspices of that school, (p. 6).

Unruh and Unruh (1984) also gave special attention to knowledge, attitudes, and skills in his definition, and explained how each one of them is an important curriculum component. They defined curriculum as:

A plan for achieving intended learning outcomes: a plan concerned with purpose, with what is to be learned, and with results of instruction. Curriculum is composed of several outcomes include knowledge, attitudes, and skills. Knowledge encompasses facts, information, principles, and generalizations that help an individual understand his or her world better. Attitudes includes values, beliefs, interpersonal feelings, creative thinking, appreciations, self-esteem, and other aspects of affective growth. Skills are techniques, processes, and abilities that enable the individual to be versatile in using knowledge and physical resources effectively to extend the horizons of his or her world, (p. 96).

An Overview of Selected Available Studies Related to Curriculum Development

According to Tyler cited by Tanner and Tanner (1975) the analysis and the development of the curriculum begin with four fundamental questions:

1. What educational purposes should the school seek to attain?
 2. What educational experiences can be provided that are likely to attain these purposes?
 3. How can these educational experiences be effectively organized?
 4. How can we determine whether these purposes are being attained?
- (p. 57).

Answering these questions Tyler proposed a four-step sequence:

- 1) Identifying objectives,
- 2) Selecting the means for attainment of these objectives,
- 3) Organizing these means, and
- 4) Evaluating the outcomes, (p. 57).

Taba (1962) agreed with Tyler's four steps pointing out that a curriculum commonly contains a statement of aims and objectives; it provides some selection and organization of content; it suggests or demonstrates some patterns of learning and teaching, whether content organization requires them or because the objectives demand the. And finally, the curriculum includes evaluation of the outcomes.

Westmeyer (1981) called attention that curriculum planning ought to initiate considering the clientele needs. He said that clients could be any or all several distinct groups served by a given curriculum - students, the community, the profession, the discipline, even the whole society in which the curriculum is offered. He also explained that the needs do not necessarily mean daily requirements: they express fundamental understandings, basic skills, behavioral abilities for learners:

They also mean knowledgeable citizens with respect to the needs of a community, skillful practitioners with respect to the needs of a profession, knowledgeable and skillful researchers with respect to the needs of a discipline and the like. (p. 3).

According to Unruh and Unruh (1984) curriculum development is a planning process:

A complex process of assessing needs, identifying decided learning outcomes, preparing for instruction to achieve the outcomes, and meeting the cultural, social, and personal needs that the curriculum is to serve. (p. 97).

They said that if curriculum development is not taking from the total culture and the total context, it will be unresponsive to changing knowledge and social personal needs and therefore, ineffective.

Tanner and Tanner (1975) pointed out that because the growing complexity of knowledge and life is so great that society looks to the school and

the curriculum as necessary for enabling the "rising generation to gain the needed insight and power to build a better society," (p. 3).

Beane, Toepfer, and Conrad (1986) mentioned that the ends and means of learning are identified through a comprehensive process they called curriculum planning.

According to them curriculum planning is a requirement in order to develop and maintain a continuous flow of knowledge, abilities, and skills through which learners may successfully pursue both individual and societal purpose. As a process, curriculum planning coordinates these general aims through everyday activities to achieve them. They said that the continuing search for excellence in education is an essential ingredient, however, "its systematic implementation in educational organizations remains an elusive goal," (p. 253).

Taylor and Richards, Colin, M., (1985) affirmed that:

No matter what ideologies are involved, curriculum development implies a degree of systematic thinking and planning in which individual decisions about content, teaching, and learning are taken, not in isolation, but in relation to an overall design or framework or, at the very least in relation to consideration of other relevant factors, (p. 92).

What criteria should be considered in curriculum development? Taba (1962) pointed out these following three criteria are very important. First, one must ask what the demands and needs of culture and society are, both for the present and the future. Second, one needs to be informed about learning process and the nature of learners. "A curriculum is a plan for learning" (p. 10), therefore, what is known about learning process and the nature of learners produces a great effect on the shaping of a curriculum. Third, the nature of knowledge and specific characteristics and unique contributions of the disciplines from which the content of curriculum is developed.

The Content of Curriculum

Beane, Toepfer, and Alessis (1986) pointed out that the content component of teaching-learning process refers to the important facts, principles, concepts, and understandings related to the objectives.

They affirmed that several issues are involved in the identification of content in specific curriculum plans:

The first has to do with related content to the organization center and to the objectives. Here those responsible for curriculum development must take decisions about what knowledge is most appropriate and most pertinent. A second issue is its relation to the lives of learners. The more pertinent content is to the needs and interests of the learner, the greater the likelihood that he or she will perceive its meaning and worth. As a result, there is a greater chance that the content will be learned and used. Yet a third issue in the identification of content focuses on its level or difficulty. Appropriateness of content depends partly on the capacity of learners to understand it, (p. 235/6).

The identification of content presented in this study to develop an agricultural curriculum model for rural schools in Northeast was based upon those issues. Revising agricultural curriculum materials from different developing countries and different American states, as also studies and researches related to agricultural curriculum were considered in developing the curriculum model.

Summary

Education and rural development are related. The better educated the rural population is, the best results are achieved in terms of production, productivity and income. Consequently, rural people can improve their condition and their quality of life.

The agricultural education experiences in North America, Europe, Japan, and Taiwan are good examples in preparing technical and managerial skilled workers to succeed in farming. Developing countries are becoming aware of educating their people. African countries, such as Cameroon and Swaziland, has been positive results emphasizing practical education in agriculture.

Investment in human capital is a fundamental tool for alleviating poverty, promoting citizenship, and changing those institutional structures that block the improving of the standards of living.

Brazil has been investing in its people at low levels, and the rural sector has been receiving much less. Rural-urban migration is high and increases the level of unemployment in the urban sector, and also increasing problems of health, sanitation, crime, and morality. Rural migrants are not skilled for urban labor markets.

Brazil has a very selective educational system based upon European tradition. Also, there is great educational differences between rural and urban sectors, with rural people coming up much worse. Million of children are not able to complete their primary education. Secondary schools in rural areas is another serious problem. Regional differences are noted. About 50 percent of Brazilian illiteracy was in Northeast in 1983. Rural curriculum must be revised.

Curriculum must emphasize society needs, preparing the student to be knowledgeable, skilled, and developing attitudes and values that help them to better jobs and help the society as a whole. Curriculum development needs to be taking from the total culture and the total context of the society, otherwise it will be unresponsive to changing knowledge and social personal needs and therefore, ineffective.

The identification of the content of curriculum involves three issues: 1) Content related to the organization center and the to the objectives; 2) Content related to the lives of learners; and 3) Content related to its level of difficulty.

CHAPTER III

DESIGN AND METHODOLOGY

Introduction

This chapter explains how the four objectives were met in order to achieve the purpose of the study.

First Objective

The first objective of the study was to examine agricultural curriculum materials from developed and developing countries and verify how these could be applied in Northeast Brazil. Agriculture curriculum materials of different schools and states of the United States were examined for the developed countries. Secondary and elementary agricultural curricula used in developing countries were also verified. With help of the student's advisor, a letter (see Appendix A) was sent to forty former international AGED/OSU graduate students in seventeen different countries, including Africa, Asia, and Latin America, requesting agricultural curricula used in their countries. Twelve curricula were received, examined, and they are summarized in Chapter IV. Several studies related to agricultural curriculum and developed by AGED/OSU graduate students were also investigated, and they are shown in Chapter IV.

Second Objective

The second objective listed in this study was to make contact with vo-ag schools in Northeast Brazil to get their curriculum, their ideas, and make recommendations. In order to accomplish this objective, a letter (see Appendix B) was sent to four vo-ag schools in Northeast Brazil. No answer was returned. Another approach for receiving their inputs was considered. A letter (see Appendix C) was sent to the National Technical Agriculture School Coordination, which is part of the Brazilian Ministry of Education, in Brasilia (Capital of Brazil). Several important documents were received and it was noticed that all federal vo-ag schools in Brazil had the same curriculum. Among the documents, one indicated that the federal government is doing studies to implant an agricultural curriculum in elementary schools for grades 5th to 8th. The summary of those documents is presented in Chapter IV.

Third Objective

The last objective of the study was to obtain the judgement of a Brazilian graduate student group majoring in agriculture in United States universities under the Brazilian Agriculture Research Corporation (EMBRAPA) and the National Research Institute (CNPq) administrations, as to the importance of a curriculum model for rural schools in Northeast Brazil. The judgement was obtained using a survey through a mailed questionnaire.

The following sections show how the size of the population was specified, how the instrument was developed, how the data were collected, and how the data were analyzed.

Population for the Survey

The population was a Brazilian graduate student group majoring in agriculture in United States universities. Those students had either a scholarship from EMBRAPA or CNPq during the development of the study.

A letter (see Appendix D) was sent by the student's advisor to EMBRAPA and CNPq requesting a list of names, addresses, majors, and telephone numbers of all Brazilian graduate students majoring in agriculture in United States universities. After receiving the lists with eighty-six names, the questionnaires were mailed to the students.

Development of the Instrument

As was mentioned before (pages 30 and 31) the questionnaire was developed after examining agricultural curriculum from American schools, and developing countries, and contacting the National Technical Agriculture Schools Coordination in Brazil.

After having collected information upon which to develop the questionnaire, a first draft of the questionnaire was submitted to the committee members for suggestions and comments. A committee meeting was requested by its chairman. In this meeting each item was discussed and suggestions for adding and deleting topics were given. After those modifications, the questionnaire (see Appendix E) was approved by the student's committee members.

The questionnaire included content that could be applied for primary and secondary schools in rural areas in Northeast Brazil. It was used to verify the

importance of the content for rural schools in that Brazilian region. The following scale was used to verify the degree of importance of the content.

TABLE II
SCALE FOR THE AGRICULTURAL CURRICULUM
MODEL IN THE QUESTIONNAIRE

Importance Level	Numbers Offered for Responses	Absolute Limits
Extremely Important	5	4.5 - 5.00
Very Important	4	3.5 - 4.49
Important	3	2.5 - 3.49
Low Importance	2	1.5 - 2.49
Not Important	1	1.0 - 1.49

Collection of Data

The questionnaires were mailed to eighty-six Brazilian graduate students majoring in agriculture in United States universities, with a self-addressed stamped envelope in order to stimulate response and returns. A cover (see Appendix F) requesting response and giving explanation about the study was enclosed. The first mailing resulted in 32 completed returns, plus five questionnaires that were not answered because the students had already returned to Brazil. After two weeks the first follow-up letter (see Appendix G)

was sent. This resulted in 25 answered and completed questionnaires, plus two answered in a way not useable for the study. These two questionnaires were not counted as part of the sample. Consequently, subtracting the five students that had moved from 86 (86-5) the population size for the study was 81. The total of completed returns was 57 (32 + 25). Considering 81 as the population size, the percentage of the return was 70.37.

Analysis of the Data

In order to determine the importance level for the curriculum model presented in this study, Descriptive Statistics were used through frequency, distributions, percentage, and means. The mean for each item was calculated multiplying the importance level score by the number of responses that the score received. Those products were added together, then divided by the total of respondents for each topic. A mean of means was calculated for each area. Histograms were used to show demographic data of the respondents and to present the final importance level of the components of the model for elementary and secondary schools. Comments of the respondents were reported and enclosed in Appendix H as well as their suggestions in adding other items.

CHAPTER IV

FINDINGS FROM CURRICULUM MATERIALS

Introduction

This chapter shows the summary of curriculum materials from developed and developing countries, including Brazil and AGED/OSU graduate studies. Those materials were analyzed in order to accomplish the first and second of this study as mentioned in Chapter III. The logical reason that supports the curriculum model presented in this study is fundamentally based upon those materials.

First Objective

The first objective of this study was to examine agricultural materials from developed and developing countries.

Developed Country Materials

Curriculum materials from American states were examined for developed countries. According to Oklahoma State Board of Vocational and Technical Education (1984), the vocational agriculture education for Oklahoma involves grades 8th through 12th. The curriculum for 8th graders contains twelve units and they are presented as a way to introduce the vocational agriculture to the students. The units are: Agriculture is More Than Farming, What is Going on in Agriculture Today, Someone You Would Like to Get to Know, Is FFA for Me?,

Select an SOEP, Application of Agricultural Math and Science, Record Keeping, Food for America, Giving a Talk with Visual Aids, Self-Discovery, Explore Agriculture as a Career, and Vocational Agriculture Builds Career. For 9th through 12th graders the core curriculum presents the units into major sections: Orientation, Leadership, Supervised Occupational Experience Programs, Animal Science, Plant Science, Agricultural Mechanics, Finance, Plant and Soil Science, Farm Business Management, and Leadership and Careers. Those sections are presented differently for each grade.

The Arkansas Department of Education (1986) shows the curriculum content for vocational agriculture I to include twenty-three units related to the following sections: Agricultural Mechanics, Animal Science, Farm Management, and Plant and Soil Science.

An elementary agriculture curriculum, agriculture in the classroom was sent to the student's major advisor from Idaho. This 4th grade curriculum presents forty-five units divided in six major sections: Language, Arts, Science, Social Studies, Mathematics, Health/Nutrition, and Resources.

The Department of Agriculture Education at Iowa State University and the Department of Public Instruction Career, Education Division (1973) presents a core curriculum in Agribusiness and Natural Resources for elementary, junior high, secondary school programs. For the elementary schools the curriculum guide presents: Animal Science, Agronomic Science, Agricultural Mechanics, Farm Business Management, Agricultural Supplies and Services, Agricultural Products Processing and Distribution, Horticulture, Natural Resources and Conservation, and Occupational Experience.

For junior high some exploratory programs are provided in 9, 12, or 18 week courses. Following are examples of 9--, 12--, and 18-- week courses in exploratory agriculture:

9-Week Course

Unit

Economic Contribution of Agriculture
Employment Opportunities in Agriculture
Educational Opportunities in Agriculture
Leadership Development
Animal Science
Plant and Soil Science
Agricultural Mechanics
Conservation of Agricultural Resources
Farm and Home Beautification

12-Week Course

Unit

Economic Contribution of Agriculture
Farm-City Relationships
Employment Opportunities in Agriculture
Educational Opportunities in Agriculture
Leadership Development
Personal Finance
Animal Science
Plant and Soil Science
Agricultural Mechanics
Home Safety
Conservation of Agricultural Resources
Farm and Home Beautification

18-Week Course

Unit

Economic Contribution of Agriculture
Farm-City Relationships
Employment Opportunities in Agriculture
Educational Opportunities in Agriculture
Leadership Development
Personal Finance
Large Animal Science
Small Animal Science
Crop and Soil Science
Agricultural Mechanics
Home Safety

Conservation of Agricultural Resources
Horticulture
Farm and Home Beautification

Secondary school programs present three alternatives: two-year, three-year, and four-year secondary core program in Agribusiness and Natural Resources. Areas related to Occupational Experience, Animal Science, Agronomic Science, and Agricultural Mechanics are required for all programs. The following are areas required only for three-year and four-year program: Farm Business Management, Agricultural Supplies and Services, Agricultural Products Processing and Distribution, Horticulture, and Agriculture Resources and Conservation.

Another curriculum material used was from the Dairy Council of California (1974), which explained the importance of balanced meals (meat group, milk group, bread-cereal group, and vegetable-fruit group). This curriculum guide for nutrition education was presented in ten lessons to be used in elementary schools.

General Outline Heart Training was a document also examined for this study. According to this document, the Heart program covers courses such as Appropriate Technology, Primary Health, Food Preparation and Nutrition, Intensive Gardening, Small Animal Husbandry, The Missionary and Community Development, and Cross-Cultural Living. For each section, many different topics were verified.

Developing Country Materials

Curriculum materials from developing countries were possible through the help of the former AGED/OSU graduate students and summarized in this section.

Eastern Carolina Islands - Federal State of Micronesia

In Micronesia, the vocational agriculture program, at PICS (Ponape Islands Central Schools) offers four courses. Agriculture I, a required course for all 9th graders, and deals with vegetable production. Agriculture II is offered to 10th graders and deals with basic principles in animal production emphasizing swine production. Agriculture III which emphasizes agronomy, and Agriculture IV which emphasizes poultry production, meat processing, and operation and machine maintenance of farm machinery.

Thailand

According to six curricula received from Thailand, the education in that country is divided into system of primary school starting from grade 1st through 6th; secondary school from 7th through 9th; and high school from 10th through 12th.

Agriculture courses for lower secondary schools (grades 7th, 8th, and 9th) are operated by Schools of Department of Secondary Education, and present their curriculum content as follows: Vegetable Garden, Ornamental Horticulture, Fruit Farming, Tree Garden, Breeding, Farm Animal Production, Small Animal Production, Medium Animal Production, Large Animal Production, Agricultural Industry, Silkworm Culture, Honey Bee culture, Mushroom Growing, and Agricultural Technology.

Agriculture courses for upper secondary education grades 10th, 11th, and 12th have their curriculum supervised by the Department of Vocational Education. Contents for those courses contain: Planting Crops, Animal Production, Planting Vegetables, Planting Ornamental Floriculture, Farm Crops,

Planting Fruit Tree, Poultry Production, Small Animal Production, Livestock Animal Production, Aquatic Animal Production, and Agricultural Engineering.

Republic of China (Taiwan)

Curriculum content for senior vocational agricultural schools in the Republic of China were promulgated by the Ministry of Education in 1987. In general, the core curriculum for vo-ag contains the following major sections: Farm Management, Forestry, Agricultural Mechanics Engineering, Food Processing, Agricultural Civil Engineering, Rural Housekeeping, and Silkworm Culture.

Philippines

According to the curriculum sent from a former student, in the Philippines, the agricultural curriculum is part of Home Industries Courses offered in both the secondary curriculum and opportunity classes for the out-of-school youth and unemployed adults. Agricultural area contains the following subjects: Vegetable Gardening, Poultry, Piggery, and Food Preservation.

Nigeria

Data from Nigeria are presented through a syllabus that was prepared in 1981 for the five year secondary school system in vogue in Nigeria and other West African countries.

Year I presents the following sections: Elementary Surveying, Vegetable Growing, Fruit Growing, School Gardening, School Compound, Public Health (Farm Hygiene), Disease and Pests of Vegetables, and Fruits Manuring.

Year II contains: Agriculture and Its Importance, Agricultural Land Use, Farming Methods, Problems of Agricultural Development, Agricultural Equipment, The Environment, Forestry, and Farm Management.

Year III presents: Soil Science (seven units) and Elements Essential to Plant Growth.

Year IV includes: Life Processes of Crop Plants, Cytology of Crop Plants, Anatomy and Morphology of Crop Plants, Nuclear Life Cycle of Crop Plants, Seed Germination, Absorption of Minerals by Crops Plants, Food Preparation by Crops Plants, Environmental Factors Affecting Plant Growth, Weeds, Crop Improvement, and Crop Production.

Year V contains: Animal Anatomy, Animal and its Food, The digestive System, Blood and Circulatory System, Animal Breeding, Role of Farm in Nigerian Economy, Defense of the Body against Infection, Animal Husbandry and Forages.

Selected Graduate AGED/OSU Studies

Some similar studies developed by AGED/OSU graduate students were also analyzed and their principal points are presented below.

Rafie (1984) developed a high school vocational agricultural curriculum model for developing countries in order to determine its applicability and importance through a selected group of international graduate students majoring in Agricultural Education in United States universities. His content model presented the following 11 major areas: Soil Science, Plant Science, Agricultural Mechanics, Animal Science, Horticulture, Agricultural Management, Forestry, Supervised Experience Programs and Record, Environment Protection, Opportunity in Agriculture, and Agriculture Extension. According to

the scale used in the study, his model was classified as being 'of Moderate Importance' (second highest category in that scale) for developing countries.

Barnett (1987) conducted a study to determine the perception of curriculum and skills to be taught to eighth grade students of vocational agriculture in Oklahoma. The content curriculum used in his study contains 5 major areas: Plant and Soil Science, Animal Science, Farm Management, Agricultural Mechanics, and Vocational Agriculture, Leadership, and Careers. Based upon his conclusions, the instructional areas for eighth graders should be in the following order: 1) Vocational Agriculture, Leadership, and Careers; 2) Farm Management; 3) Animal Science; 4) Agricultural Mechanics; and 5) Plant and Soil Science. He also presented the units that should be included in each area according to the survey findings.

Al-Zaidi (1982) developed a study in order to assess the degree of adequacy of curriculum and training in agriculture provided by three different institutes in Saudi Arabia. The assessment was provided by administrators, instructors, senior students, and regional directors from those institutes. The curriculum content used by Al-Zaidi presented the following major areas: Agricultural Economics, Rural Sociology, and Agricultural Extension; Plant Production and Protection; Agricultural Mechanics and Soil Science; Animal Production and Food Technology; General Courses; Summer Internship. The major conclusion was that the components of the curriculum in agriculture presented in his study were considered to be either 'Important' or 'Very Important' by almost all groups that answered the survey.

Second Objective

The second objective listed in this study was to make contact with vo-ag schools in Northeast Brazil for their curriculum, having their ideas, and making recommendations.

This objective was accomplished through the documents received from National Technical Agriculture Schools Coordination (COAGRI-Coordena,ção Nacional do Ensino Agropecuario) which is part of the Ministry of Education in Brazil.

According to COAGRI (1985) there are 36 Federal Technical Agriculture Schools in Brazil presenting the same core curriculum and being located in different states and regions. The Technical Agriculture school curriculum offers courses for three years (grades 10th, 11th, and 12th) and its content presents two large areas: General Education and Special Formation. The last area involves topics specifically related to vo-ag courses. Curriculum content for areas of Special Formation is presented as follow:

I. Agriculture

- a) Horticulture - especially vegetable production and garden (first year).
- b) Temporary Regional Crops - principally crops such as corn, rice, beans, sugar cane, cassava, sorghum and soybeans (second year).
- c) Perennial Crops - basically forestry, fruits, and moulting production (third year).

II. Zootechny

- a) Small Animals - especially poultry, fish, rabbit, bees, silkworm, and frogs (first year).

b) Medium Animals - basically swine, goats, and sheep (second year).

c) Large Animals - principally dairy cow, cattle, horses, and buffaloes (third year).

III. Regional Studies and Rural Economics and Administration (third year)

IV. Design and Topography (second year)

V. Irrigation and Drainage (third year)

VI. Constructions and Installations (third year)

VII. Writing and Speaking (third year)

VIII. Supervised Experience Program (third year)

Brazil is presently involved in a project to implement agricultural courses as part of the core curriculum for primary schools in rural areas of the country. According to COAGRI (1987) the project includes grades 5th to 8th and determines their agricultural content as:

I. Practice in Agriculture

a) 5th grade - Simple vegetable production activities.

b) 6th grade - Complex vegetable production activities.

c) 7th grade - Annual crops.

d) 8th grade - Perennial crops.

II. Practice in Zootechny

a) 5th and 6th grades - Activities with small animals.

b) 7th grade - Activities with medium animals.

c) 8th grade - Activities with large animals.

III. Practices in Commerce

a) 6th grade - Accounting, Commercialization, and Bank Operations.

IV. Industrial Practices

No grades were specified for this area. It involves industrialization, processing products from plants and animals, and other industrial activities, with rural environment relations. Those activities should be done in the student's home location.

Based upon those materials and ideas the agricultural curriculum model proposed in this study was formulated as being the best for Northeast Brazil. It can be found in Appendix E as part of the questionnaire used to verify its importance for rural school in that part of the country.

CHAPTER V

PRESENTATION AND ANALYSIS OF SURVEY DATA

Introduction

The data presented in this chapter were gathered from 57 Brazilian graduate students majoring in agriculture in United States universities.

The purpose of this chapter is to present the data compiled from those 57 students that responded to the survey and to report those facts shown through analysis of the data collected.

Background of the Respondents

Fifty-seven Brazilian graduate students answered the questionnaire. Figures 1, 2, 3, 4, 5, and 6 summarize the background information of the respondents as asked on the questionnaire.

Figure 1 shows the age of the respondents, which ranged from 25 to 50. The ages 25-30 were selected for the first interval, 31-35 for the second, 36-40 for the third, 41-45 for the last interval. Most of the respondents were between ages 25-30 as presented in first interval in Figure 1. The next highest group was in the third interval with 16 respondents with age between 36-40. The lowest group was in the fifth interval with age between 46-50 presenting only three respondents.

Figure 2 presents the sex of the respondents. Fifty-two respondents were males and only five were females.

FIGURE 1. AGE OF THE RESPONDENTS HISTOGRAM

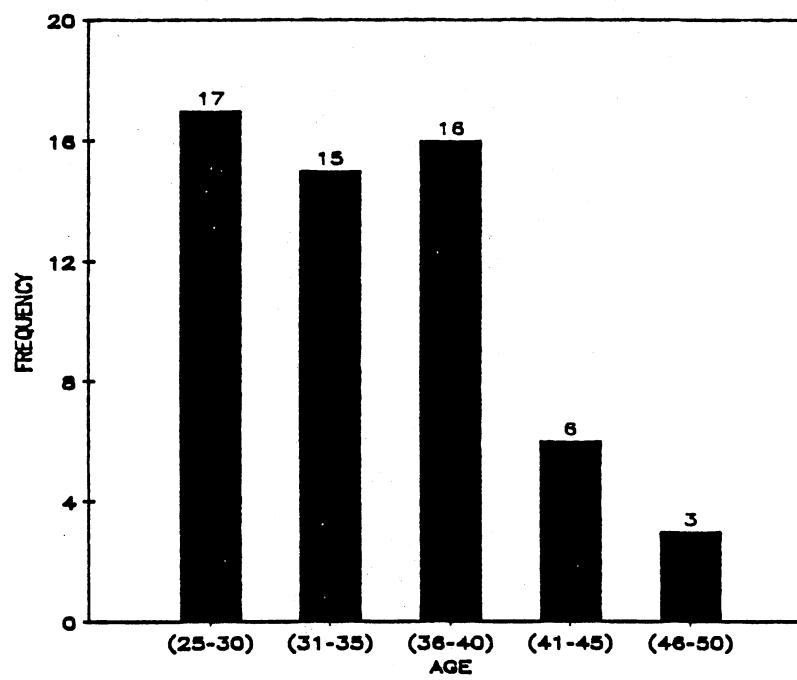
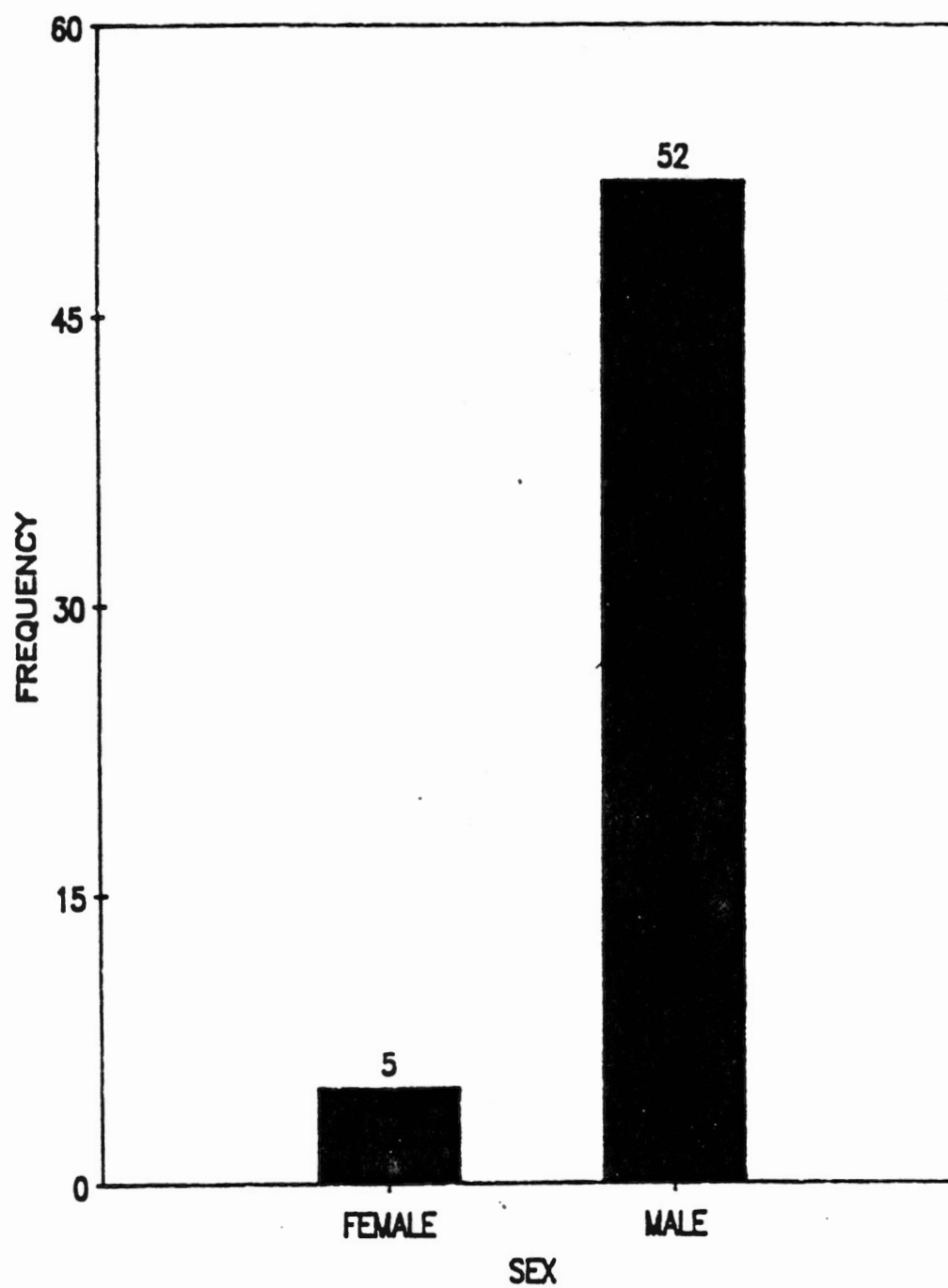


FIGURE 2. SEX OF THE RESPONDENTS HISTOGRAM



The respondents' majors are shown in Figure 3. It is relevant to mention that twenty-five different agricultural majors were presented in this study. The highest proportion was in Agricultural Engineering with eight respondents. The next highest was Plant Pathology with six students. Agronomy, Animal Science, and Plant Genetic and Breeding had five respondents in each major. Soil Science, Food Science, and Entomology presented four, three, and two respondents, respectively. Fifteen respondents were working in 15 different agricultural majors.

The degrees of the respondents are presented in Figure 4. According to the data presented in Figure 4, forty-four respondents were working towards a Ph.D. degree, seven were working towards a Post-doctoral studies, and only six of the respondents were working towards a Master's degree.

Figure 5 presents a summary of the respondent's birth places. Twenty-nine were born in cities representing the largest group. Sixteen were born in small towns and eleven in rural villages. Only one respondent was born in a metropolis.

Figure 6 presents the respondent's years of involvement in agriculture. Twenty-one of the respondents have been involved in agriculture for more than 15 years. Seventeen of them have been working in agriculture for 11 to 15 years. The group between 0-5 years of involvement presented 10 respondents. The group that presented the lowest number was (6-10) with nine respondents.

The Agricultural Curriculum Model for Elementary Schools

Plant and Soil Science

There were 19 topics listed under the Plant and Soil Science area. The summary of mean scores and the mean of means for this area is presented in

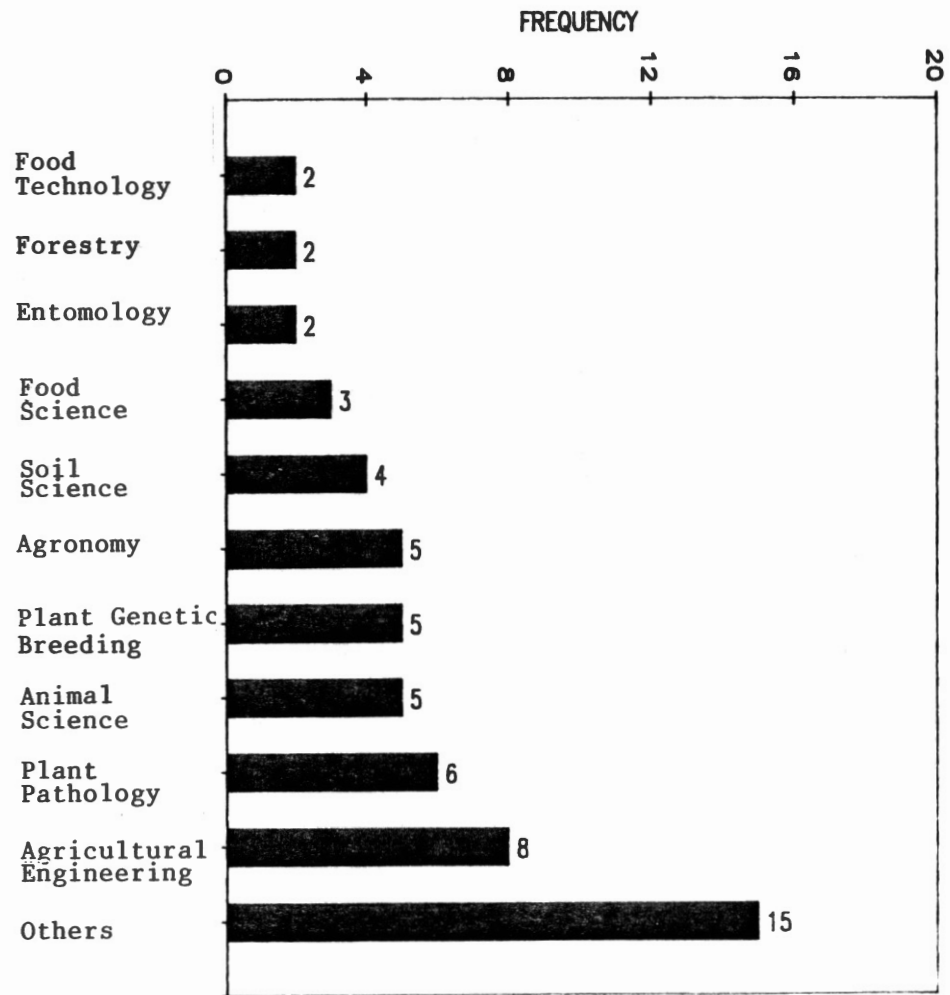


FIGURE 3. MAJORS OF THE RESPONDENTS HISTOGRAM

FIGURE 4. DEGREE OF THE RESPONDENTS HISTOGRAM

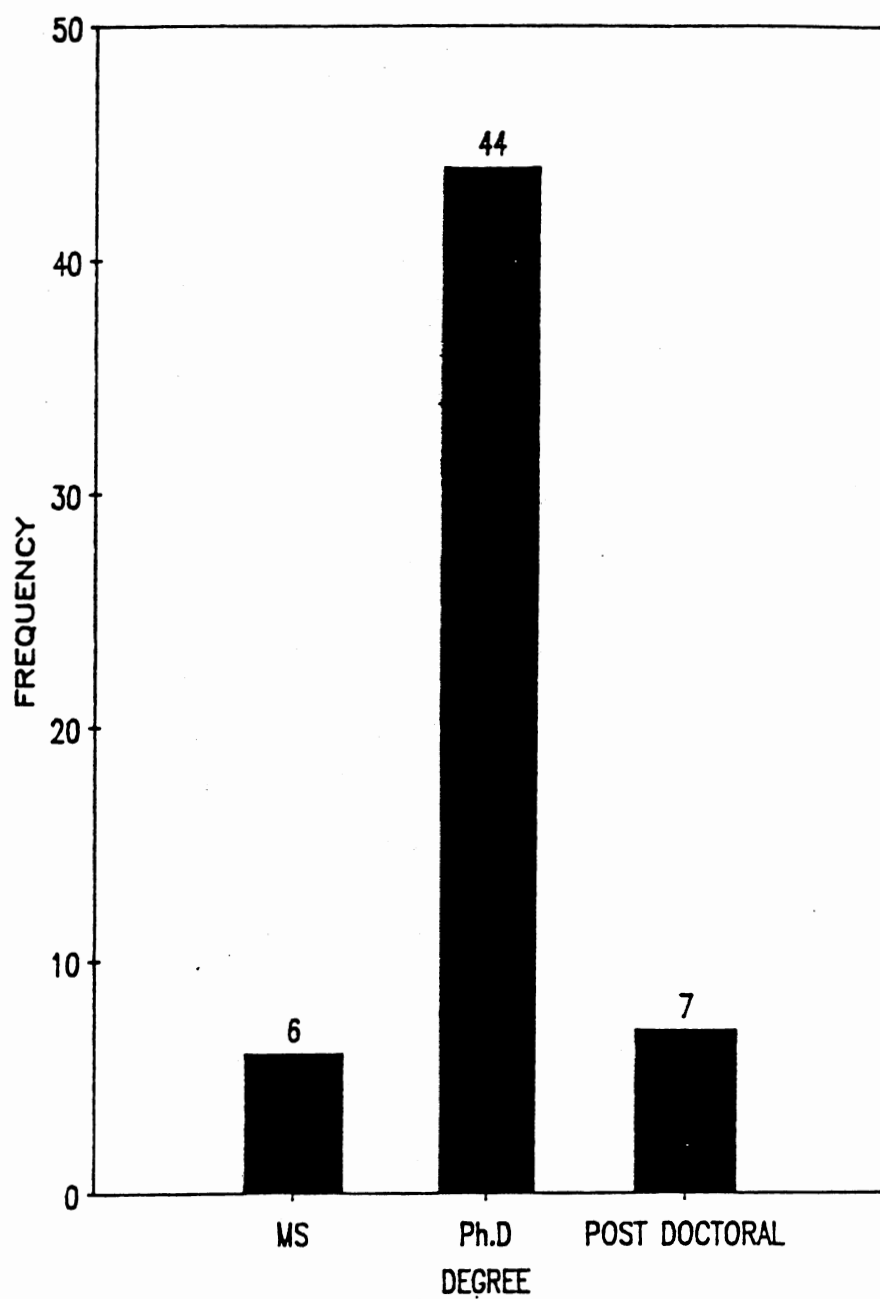


FIGURE 5. BIRTH PLACE OF THE RESPONDENTS HISTOGRAM

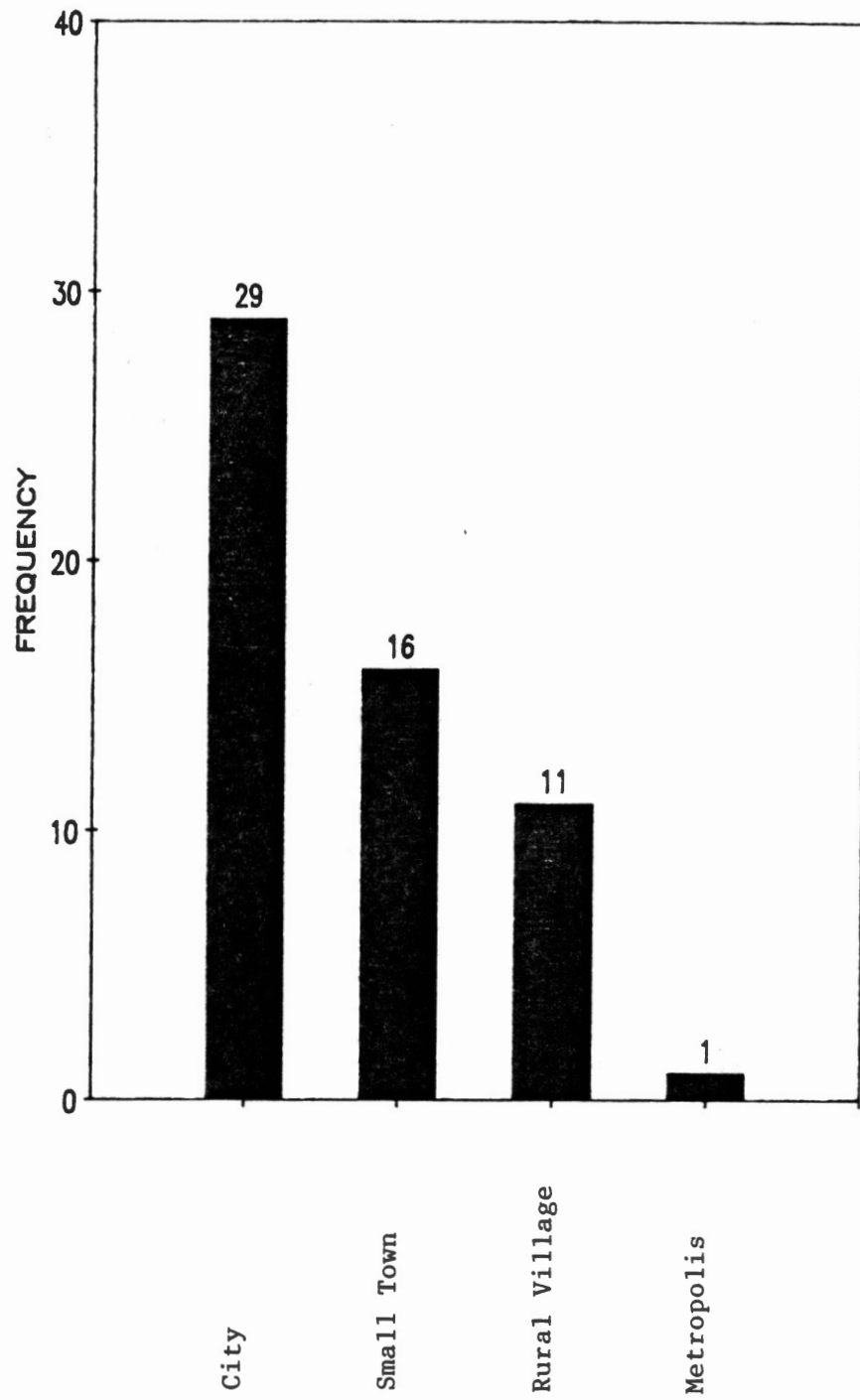


FIGURE 6. YEARS OF INVOLVEMENT IN AGRICULTURE
OF THE RESPONDENTS HISTOGRAM

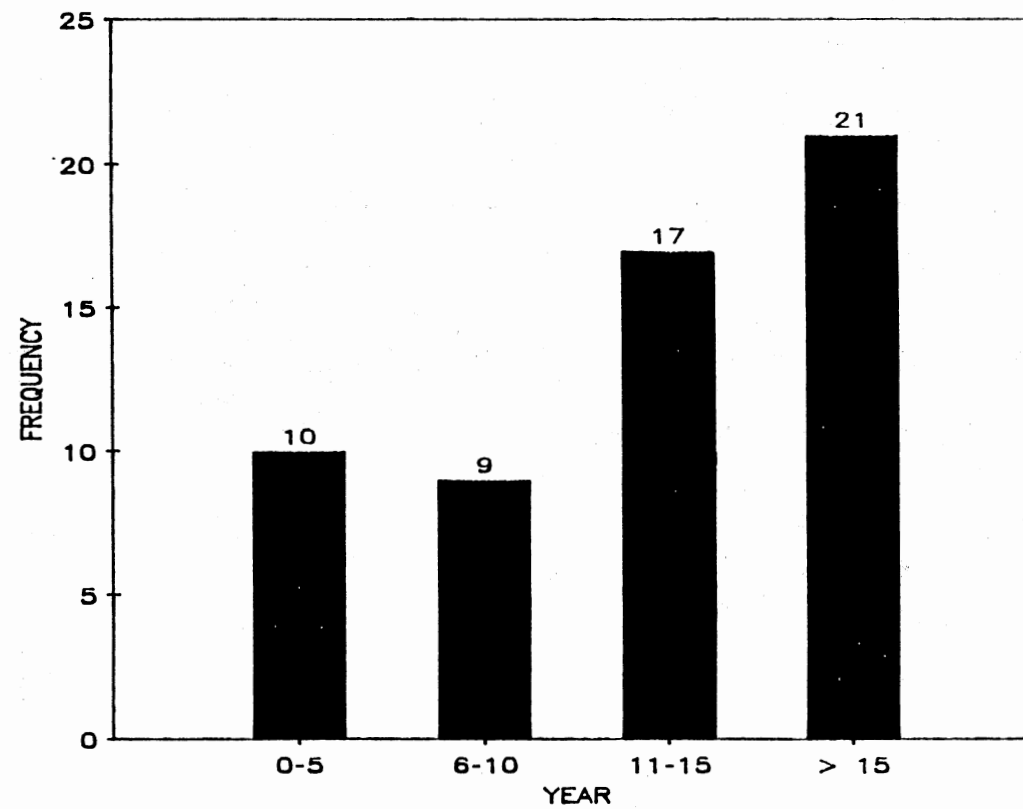


Table III. The topic of 'Importance of Plants' was indicated by the respondents as being the most important topic with a 4.40 rating. The next important rated topic was 'Basic Horticulture' with a 4.05. The lowest item was 'Oil Plant' with 3.00 rating. The mean of means for this area was 3.52, which is included in the category of 'Very Important'.

Nutrition and Health

Data for Nutrition and Health are presented in Table IV where five items were specified. 'General Human Nutrition' received the highest score with a 4.54 rating. It was followed immediately by 'General Health' with mean responses of 4.53. The item which rated the lowest was 'Nutrients' with a 3.79. The mean of means for this area was 4.13 which is classified in the category of 'Very Important'.

Animal Science

Table V summarizes the data of the fourteen items listed under the area of Animal Science. 'The Importance of Animals' with a 4.23 mean rating was indicated by the respondents as being the most important topic. The next two highest rated items were 'Feeding and Caring for Small Animals' and 'Feeding and Caring for Large Animals' with mean responses of 3.68 and 3.65, respectively. The two lowest rated topics were 'Livestock Judging Selection' and 'Stock Show, Rules, Procedures' with mean responses of 2.12 and 2.18. The area was categorized as 'Important' with an overall mean of means of 3.17.

TABLE III

SUMMARY OF PLANT AND SOIL SCIENCE AREA FOR THE
ELEMENTARY CURRICULUM MODEL

Plant and Soil Science	Extremely Important		Very Important		Important		Low Importance		Not Important		Mean	Category
	N	%	N	%	N	%	N	%	N	%		
1. Importance of Plants	35	61.4	12	21.1	8	14.0	2	3.5	--	--	4.40	VI
2. Crop Production	12	21.1	22	38.6	17	29.8	6	10.5	--	--	3.70	VI
3. Major Crops in Northeast Brazil	24	42.1	12	21.1	17	29.8	2	3.5	2	3.5	3.95	VI
4. Oil Plant	6	10.5	8	14.0	26	45.6	14	24.6	3	5.3	3.00	I
5. Weeds	4	7.0	10	17.6	28	49.1	13	22.8	2	3.5	3.02	I
6. Seed Selection	9	15.8	15	26.3	20	35.1	11	19.3	2	3.5	3.35	I
7. Planting	14	24.6	24	42.1	12	21.0	6	10.5	1	1.8	3.77	VI
8. Plant Reproduction	6	10.5	9	15.8	24	42.1	15	26.3	3	5.3	3.00	I
9. Insects	6	10.5	13	22.8	28	49.1	9	15.8	1	1.8	3.25	I
10. Plant Diseases	5	8.8	11	19.3	26	45.6	13	22.8	2	3.5	3.07	I
11. Basic Horticulture	29	50.8	14	24.6	12	21.1	2	3.5	--	--	4.05	VI
12. Study of Soil	8	14.0	14	24.6	24	42.1	10	17.5	1	1.8	3.32	I
13. Soil Fertility	10	17.5	12	21.1	20	35.0	14	24.6	1	1.8	3.28	I
14. Soil Preparation	16	28.1	20	35.0	18	31.6	3	5.3	--	--	3.86	VI
15. Fertilizers	10	17.5	7	12.3	27	47.3	12	21.1	1	1.8	3.23	I
16. Irrigation	26	45.6	15	26.3	11	19.3	4	7.0	1	1.8	3.89	VI
17. Soil Drainage	11	19.3	12	21.1	22	38.5	11	19.3	1	1.8	3.37	I
18. Harvesting	8	14.0	16	28.1	24	42.1	9	15.8	--	--	3.40	I
19. Storing	21	36.8	14	24.6	18	31.6	4	7.0	--	--	3.91	VI

N=57; Mean of Means=3.52; Extremely Important=5; Very Important=4; Important=3; Low Importance=2; and Not Important=1.

TABLE IV
SUMMARY OF NUTRITION AND HEALTH AREA FOR THE
ELEMENTARY CURRICULUM MODEL

Nutrition and Health	Extremely Important		Very Important		Important		Low Importance		Not Important		Mean	Category
	N	%	N	%	N	%	N	%	N	%		
1. General Human Nutrition	39	68.4	10	17.5	8	14.1	--	--	--	--	4.54	EI
2. General Health	37	64.9	13	22.8	7	12.3	--	--	--	--	4.53	EI
3. Energy & Food	16	28.1	17	29.8	21	36.8	2	3.5	1	1.8	3.89	VI
4. Nutrients	16	28.1	19	33.3	16	28.1	6	10.5	--	--	3.79	VI
5. Four Basic Food Groups	19	33.3	19	33.3	13	22.8	5	8.8	1	1.8	3.88	VI

N=57; Mean of Means=4.13; Extremely Important=5; Very Important=4; Important=3; Low Importance=2; and Not Important=1.

TABLE V
SUMMARY OF ANIMAL SCIENCE AREA FOR THE
ELEMENTARY CURRICULUM MODEL

Animal Science	Extremely Important		Very Important		Important		Low Importance		Not Important		Mean	Category
	N	%	N	%	N	%	N	%	N	%		
1. The Importance of Animals	34	59.6	7	12.3	12	21.0	3	5.3	1	1.8	4.23	VI
2. Livestock Management	7	12.3	18	31.5	24	42.1	7	12.3	1	1.8	3.40	I
3. Feeding & Caring for small Animals	12	21.0	22	38.6	17	29.8	5	8.8	1	1.8	3.68	VI
4. Feeding & Caring for medium Animals	9	15.8	24	42.1	19	33.3	5	8.8	--	--	3.65	VI
5. Feeding & Caring for large Animals	9	15.8	19	33.3	16	28.1	12	21.0	1	1.8	3.40	I
6. Animal Nutrition	9	15.8	18	31.5	20	35.1	9	15.8	1	1.8	3.44	I
7. Animal Housing	4	7.0	10	17.6	29	50.9	12	21.0	2	3.5	3.04	I
8. Animal Digestion	2	3.5	6	10.5	22	38.6	19	33.3	8	14.1	2.56	I
9. Animal Health	10	17.6	15	26.2	22	38.6	10	17.6	--	--	3.44	I
10. Stock Show, Rules, Procedures	2	3.5	2	3.5	17	29.8	19	33.4	17	29.8	2.18	LI
11. Livestock Judging, Selection	2	3.5	2	3.5	14	24.6	22	38.6	17	29.8	2.12	LI
12. Breeding	5	8.8	8	14.0	22	38.6	17	29.8	5	8.8	2.84	I
13. Pastures & Other Forages	8	14.0	20	35.1	24	42.1	5	8.8	--	--	3.54	VI
14. Marketing	5	8.8	10	17.5	21	36.8	14	24.6	7	12.3	2.86	I

N=57; Mean of Means=3.17; Extremely Important=5; Very Important=4; Important=3; Low Importance=2; and Not Important=1.

Agricultural Mechanics

Twelve topics were listed under the area of Agriculture Mechanics, as shown in Table VI. 'Farm Safety' was indicated by the respondents as being the most important item with 3.95 mean score. The next highest was 'Tool Identification' with a 3.77 rating. 'Agricultural Mechanics' and 'Machine Maintenance' had the same mean score with 3.60. 'Painting' was the lowest rated topic with 2.88. Receiving only a slightly higher mean response was 'Welding' with a 2.91. The mean of means for Agricultural Mechanics was 3.37 which stays in the category of 'Important'.

Farm Management

Table VII presents the five items listed under the area of Farm Management. 'Weight and Measurement' was the most important item indicated by the respondents with mean of 3.68. The next highest was 'Importance of Farm Management' with a mean score of 3.49. The lowest mean score was 'Bank Operations' rating only 2.79. The mean of means for this table was 3.24, which stays in the category of 'Important'.

Leadership

There were four items listed under the area of Leadership. The data for this area are summarized in Table VIII. 'Every Day Life Skills' was indicated by the respondents as being the most important item for this area with 3.79 rating. 'Parliamentary Procedure' was the lowest item rated with a 2.88. The mean of means for area of Leadership was 3.26, which is in the category of 'Important'.

TABLE VI
SUMMARY OF AGRICULTURAL MECHANICS AREA FOR THE
ELEMENTARY CURRICULUM MODEL

Agricultural Mechanics	Extremely Important		Very Important		Important		Low Importance		Not Important		Mean	Category
	N	%	N	%	N	%	N	%	N	%		
1. Agricultural Mechanics	11	19.3	19	33.3	21	36.8	5	8.8	1	1.8	3.60	VI
2. Tool Identification	17	29.8	18	31.6	15	26.3	6	10.5	1	1.8	3.77	VI
3. Woodworking	13	22.8	19	33.3	16	28.1	8	14.0	1	1.8	3.61	VI
4. Carpentry	11	19.3	20	35.1	16	28.1	10	17.5	--	--	3.56	VI
5. Welding	4	7.0	10	17.5	24	42.1	15	26.4	4	7.0	2.91	I
6. Small Engines	9	15.8	9	15.8	27	47.3	11	19.3	1	1.8	3.25	I
7. Plumbing	7	12.3	12	21.0	21	36.8	15	26.4	2	3.5	3.12	I
8. Hardware Identification	8	14.0	11	19.3	23	40.4	13	22.8	2	3.5	3.17	I
9. Using & Framing Square	4	7.0	9	15.8	29	50.9	12	21.0	3	5.3	2.98	I
10. Farm Safety	18	31.5	21	36.8	16	28.1	1	1.8	1	1.8	3.95	VI
11. Painting	7	12.3	7	12.3	19	33.3	20	35.1	4	7.0	2.88	I
12. Machine Maintenance	10	17.5	20	35.1	21	36.9	6	10.5	--	--	3.60	VI

N=57; Mean of Means=3.37; Extremely Important=5; Very Important=4; Important=3; Low Importance=2; and Not Important=1.

TABLE VII
SUMMARY OF FARM MANAGEMENT AREA FOR THE
ELEMENTARY CURRICULUM MODEL

Farm Management	Extremely Important		Very Important		Important		Low Importance		Not Important		Mean	Category
	N	%	N	%	N	%	N	%	N	%		
1. Importance of Farm Management	14	24.6	14	24.6	18	31.5	8	14.0	3	5.3	3.49	I
2. Introduction to Accounting	6	10.5	11	19.3	24	42.1	12	21.1	4	7.0	3.05	I
3. Bank Operations	5	8.8	8	14.0	20	35.1	18	31.6	6	10.5	2.79	I
4. Commercialization	11	19.3	11	19.3	18	31.6	12	21.0	5	8.8	3.19	I
5. Weight & Measure- ment	13	22.8	21	36.8	16	28.1	6	10.5	1	1.8	3.68	VI

N=57; Mean of Means=3.24; Extremely Important=5; Very Important=4; Important=3; Low Importance=2; and Not Important=1.

TABLE VIII
SUMMARY OF LEADERSHIP AREA FOR THE
ELEMENTARY CURRICULUM MODEL

Leadership	Extremely Important		Very Important		Important		Low Importance		Not Important		Mean	Category
	N	%	N	%	N	%	N	%	N	%		
1. Parliamentary Procedure	6	10.5	10	17.5	19	33.3	15	26.4	7	12.3	2.88	I
2. Public Speaking	9	15.8	7	12.3	21	36.8	15	26.4	5	8.8	3.00	I
3. Becoming a Good Leader	15	26.3	5	8.8	26	45.6	7	12.3	4	7.0	3.35	I
4. Everyday Life Skills	18	31.6	20	35.1	12	21.0	3	5.3	4	7.0	3.79	VI

N=57; Mean of Means=3.26; Extremely Important=5; Very Important=4; Important=3; Low Importance=2; and Not Important=1.

Overall Importance of the Curriculum for Elementary Schools

Six areas were listed in the agricultural curriculum model for elementary schools and they are summarized in Figure 7. 'Nutrition and Health' was indicated by the respondents as being the most important area for the elementary curriculum with an overall mean response of 4.13. The next highest was 'Plant and Soil Science' with mean responses of 3.51. 'Animal Science' presented the lowest mean score with a 3.17. The grand mean score for the elementary curriculum was 3.45, which stays in the category of 'Important'.

Agricultural Curriculum Model for Secondary Schools

Plant and Soil Science

Twenty-two items were listed under the area of Plant and Soil Science for the secondary schools as presented in Table IX. 'Importance of Agriculture' was indicated by the respondents as being the most important topic with a 4.46 rating. It was followed by 'Soil Conservation' by a slightly difference with a mean 4.42 rating. The next highest was 'Irrigation' with a mean score of 4.35. 'Soil Morphology' presented the lowest mean score with a 3.00 rating. The overall mean score for the Plant and Soil Science was 3.90, which stays in the category of 'Very Important'.

Animal Science

The summary of Animal Science area is shown in Table X where nineteen topics were listed. 'The Importance of Animals' was indicated by the respondents as being the important item with 4.17 rating. The next highest was 'Animal Health' with a 3.93 rating. It was followed by the topics of 'Using

FIGURE 7. IMPORTANCE LEVEL OF THE AREAS FOR THE
ELEMENTARY CURRICULUM MODEL

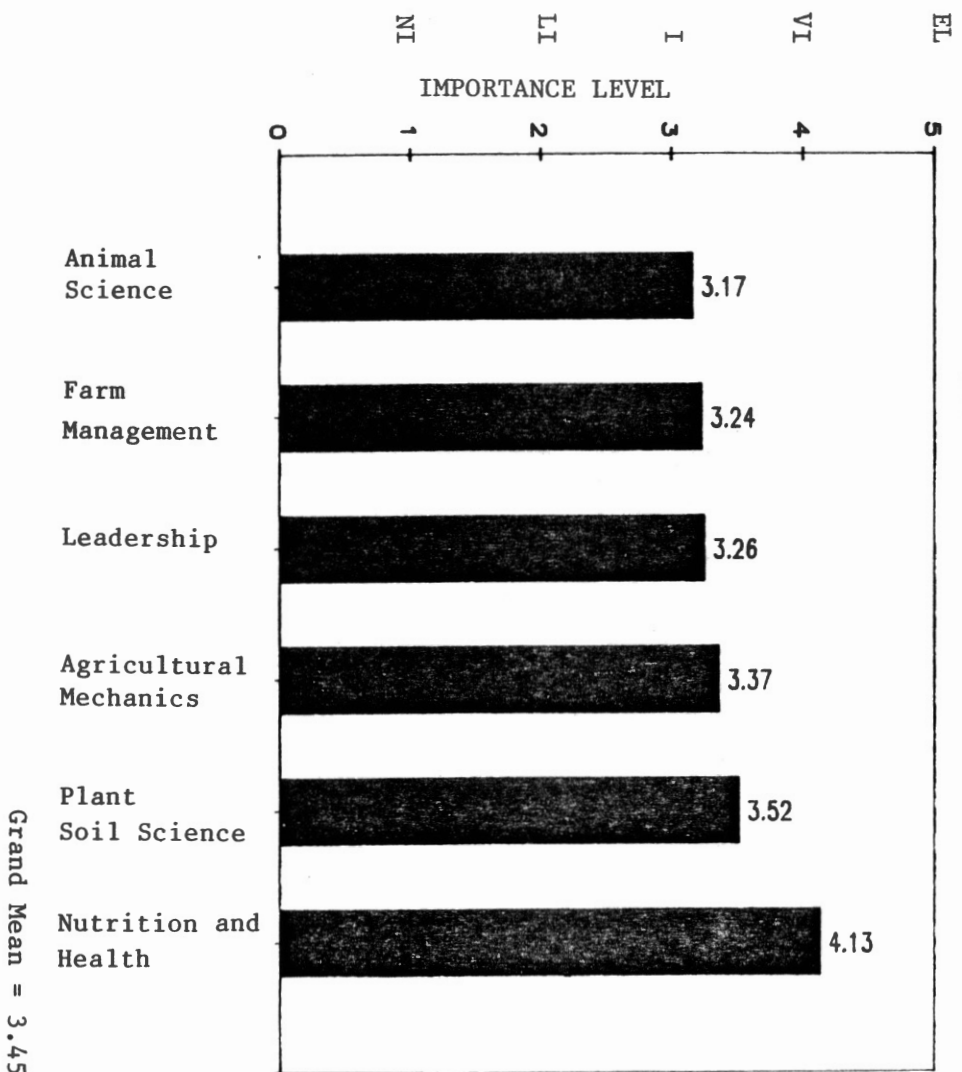


TABLE IX
SUMMARY OF PLANT AND SOIL SCIENCE AREA FOR THE
SECONDARY CURRICULUM MODEL

Plant and Soil Science	Extremely Important		Very Important		Important		Low Importance		Not Important		Mean	Category
	N	%	N	%	N	%	N	%	N	%		
1. Importance of Agriculture	35	61.4	14	24.5	7	12.3	1	1.8	--	--	4.46	VI
2. Plant Growth	12	21.0	27	47.4	18	31.6	--	--	--	--	3.89	VI
3. Plant Nutrients	10	17.5	32	56.1	14	24.6	1	1.8	--	--	3.89	VI
4. Seed Selection	14	24.6	24	42.1	17	29.8	2	3.5	--	--	3.88	VI
5. Planting	17	29.8	27	47.4	13	22.8	--	--	--	--	4.07	VI
6. Plant Reproduction	8	14.0	19	33.3	27	47.4	3	5.3	--	--	3.56	VI
7. Weed Control	12	21.0	19	33.3	22	38.6	3	5.3	1	1.8	3.67	VI
8. Plant Insect Control	14	24.6	19	33.3	20	35.0	3	5.3	1	1.8	3.74	VI
9. Plant Diseases	11	19.3	22	38.6	20	35.0	3	5.3	1	1.8	3.68	VI
10. Crop Production	15	26.3	27	47.4	15	26.3	--	--	--	--	4.00	VI
11. Marketing Crops	9	15.8	23	40.4	20	35.0	4	7.0	1	1.8	3.61	VI
12. Horticulture	32	56.1	14	24.5	9	15.8	1	1.8	1	1.8	4.32	VI
13. Harvesting	17	29.8	23	40.3	15	26.3	1	1.8	1	1.8	3.95	VI
14. Storing	25	43.9	20	35.0	10	17.5	1	1.8	1	1.8	4.17	VI
15. Study of Soils	15	26.3	20	35.0	17	29.9	3	5.3	2	3.5	3.75	VI
16. Soil Conservation	30	52.6	21	36.9	6	10.5	--	--	--	--	4.42	VI
17. Soil Fertility	15	26.3	22	38.6	19	33.3	1	1.8	--	--	3.89	VI
18. Soil Morphology	6	10.5	5	8.8	31	54.4	13	22.8	2	3.5	3.00	I
19. Erosion	32	56.1	17	29.9	8	14.0	--	--	--	--	4.14	VI
20. Soil Sampling	8	14.0	23	40.4	19	33.3	6	10.5	1	1.8	3.54	VI
21. Irrigation	32	56.1	17	29.9	6	10.5	2	3.5	--	--	4.35	VI
22. Drainage	18	31.5	17	29.9	17	29.9	5	8.7	--	--	3.84	VI

N=57; Mean of Means=3.9; Extremely Important=5; Very Important=4; Important=3; Low Importance=2; and Not Important=1.

TABLE X

SUMMARY OF ANIMAL SCIENCE FOR THE SECONDARY CURRICULUM MODEL

Animal Science	Extremely Important		Very Important		Important		Low Importance		Not Important		Mean	Category
	N	%	N	%	N	%	N	%	N	%		
1. The Importance of Animals	28	49.1	16	28.0	9	15.8	3	5.3	1	1.8	4.17	VI
2. Using Livestock Products	13	22.8	29	50.8	12	21.1	2	3.5	1	1.8	3.89	VI
3. The Livestock Industry	3	5.3	19	33.3	29	50.9	4	7.0	2	3.5	3.30	I
4. Breeds of Livestock	5	8.8	20	35.1	25	43.8	7	12.3	--	--	3.42	I
5. Livestock Selection	9	15.8	18	31.6	22	38.6	8	14.0	--	--	3.49	I
6. Livestock Feeding	13	22.8	25	43.9	15	26.3	4	7.0	--	--	3.82	VI
7. Animal Nutrients	9	15.8	22	38.6	21	36.8	5	8.8	--	--	3.61	VI
8. Animal Housing	7	12.3	15	26.3	27	47.3	5	8.8	3	5.3	3.32	I
9. Animal Digestion	2	3.5	16	28.1	25	43.8	11	19.3	3	5.3	3.05	I
10. Animal Health	18	31.6	20	35.1	16	28.0	3	5.3	--	--	3.93	VI
11. Diseases of Animals	14	24.6	23	40.3	17	29.8	3	5.3	--	--	3.84	VI
12. Parasites of Animals	13	22.8	24	42.1	19	33.3	1	1.8	--	--	3.86	VI
13. Collecting & Examining Semen	6	10.5	7	12.3	20	35.1	17	29.8	7	12.3	2.79	I
14. Artificial Insemination	7	12.3	12	21.0	21	36.9	11	19.3	6	10.5	3.05	I
15. Fertility & Pregnancy Testing	4	7.0	13	22.9	22	38.6	12	21.0	6	10.5	2.86	I
16. Market Goods	6	10.5	9	15.8	23	40.3	13	22.9	6	10.5	2.93	I
17. Marketing Livestock	5	8.8	16	28.1	23	40.3	9	15.8	4	7.0	3.16	I
18. Animal Identification	5	8.8	15	26.3	24	42.1	6	10.5	7	12.3	3.09	I
19. Animal Judging	2	3.5	9	15.8	21	36.9	12	21.0	13	22.8	2.56	I

N=57; Mean of Menas=3.37; Extremely Important=5; Very Important=4; Important=3; Low Importance=2; and Not Important=1.

Livestock Products', 'Parasite of Animals', Diseases of Animals', and 'Livestock Feeding' with their respective means 3.89, 3.86, 3.84, and 3.82. 'Animal Judging' presented the lowest mean score with a 2.56 rating. It was followed by 'Collecting and Examining Semen' and 'Fertility and Pregnancy Testing' with 2.79 and 2.86, respectively. This area presented an overall mean of 3.37, which stays in the category of 'Important'.

Agricultural Mechanics

Table XI summarizes the ten items listed under the area of Agricultural Mechanics. The most important item indicated by the respondents was 'Farm Safety' with a 4.30 rating. 'Machine Maintenance' and 'Rural Construction' were the two next highest with 4.17 and 4.10, respectively. The topic of 'Painting' presented the lowest mean response with a 2.91. It was followed by "Metal Work" with a 3.02 rating. The overall mean score for this group was 3.59, which stays under the category of 'Very Important'.

Farm Management

Four items were classified under the area of Farm Management as shown in Table XII. The most important item indicated by the respondents was 'Importance of Farm Management' with a 4.23 rating. It was followed by 'Managing a Farm' with a 3.91 rating. 'Selecting a Farm' was the lowest mean with a 3.49 rating. The overall mean for this group was 3.85, which stays in the category of 'Very Important'.

TABLE XI
SUMMARY OF AGRICULTURAL MECHANICS AREA FOR THE
SECONDARY CURRICULUM MODEL

Agricultural Mechanics	Extremely Important		Very Important		Important		Low Importance		Not Important		Mean	Category
	N	%	N	%	N	%	N	%	N	%		
1. Farm Safety	29	50.8	18	31.6	9	15.8	1	1.8	--	--	4.30	VI
2. Welding	5	8.8	12	21.0	27	47.4	12	21.0	1	1.8	3.14	I
3. Carpentry	12	21.0	12	21.0	23	40.4	10	17.6	--	--	3.46	I
4. Metal Work	7	12.3	7	12.3	24	42.1	18	31.5	1	1.8	3.02	I
5. Plumbing	9	15.8	12	21.0	18	31.6	18	31.6	--	--	3.21	I
6. Rural Electricity	17	29.8	17	29.8	16	28.1	5	8.8	2	3.5	3.74	VI
7. Engine Operation	15	26.3	18	31.6	21	36.8	2	3.5	1	1.8	3.88	VI
8. Rural Construction	22	38.6	20	35.1	14	24.5	1	1.8	--	--	4.10	VI
9. Painting	3	5.3	15	26.3	16	28.0	20	35.1	3	5.3	2.91	I
10. Machine Maintenance	24	42.1	22	38.5	9	15.8	1	1.8	1	1.8	4.17	VI

N=57; Mean of Means=3.59; Extremely Important=5; Very Important=4; Important=3; Low Importance=3; and Not Important=1.

TABLE XII

SUMMARY OF FARM MANAGEMENT AREA FOR THE
SECONDARY CURRICULUM MODEL

Farm Management	Extremely Important		Very Important		Important		Low Importance		Not Important		Mean	Category
	N	%	N	%	N	%	N	%	N	%		
1. Importance of Farm Management	27	47.3	20	35.1	7	12.3	2	3.5	1	1.8	4.23	VI
2. Selecting a Farm	8	14.0	25	43.8	14	24.6	7	12.3	3	5.3	3.49	I
3. Managing a Farm	16	28.1	26	45.6	11	19.3	2	3.5	2	3.5	3.91	VI
4. Using Weight & Measurement	15	26.3	20	35.1	17	29.8	3	5.3	2	3.5	3.75	VI

N=57; Mean of Means=3.85; Extremely Important=5; Very Important=4; Important=3; Low Importance=2; and Not Important=1.

Leadership

Table XIII presents the five topics listed under the area of Leadership. The highest score presented in this Table was 'General Activities in the Community' with a 4.28 rating. The next highest was 'General Activities at School' with a 3.95 rating. The topic 'Contests' showed the lowest mean score with a 3.21. The group presented the overall mean of 3.69 which stays in the category of 'Very Important'.

Overall Importance of the Curriculum for Secondary Schools

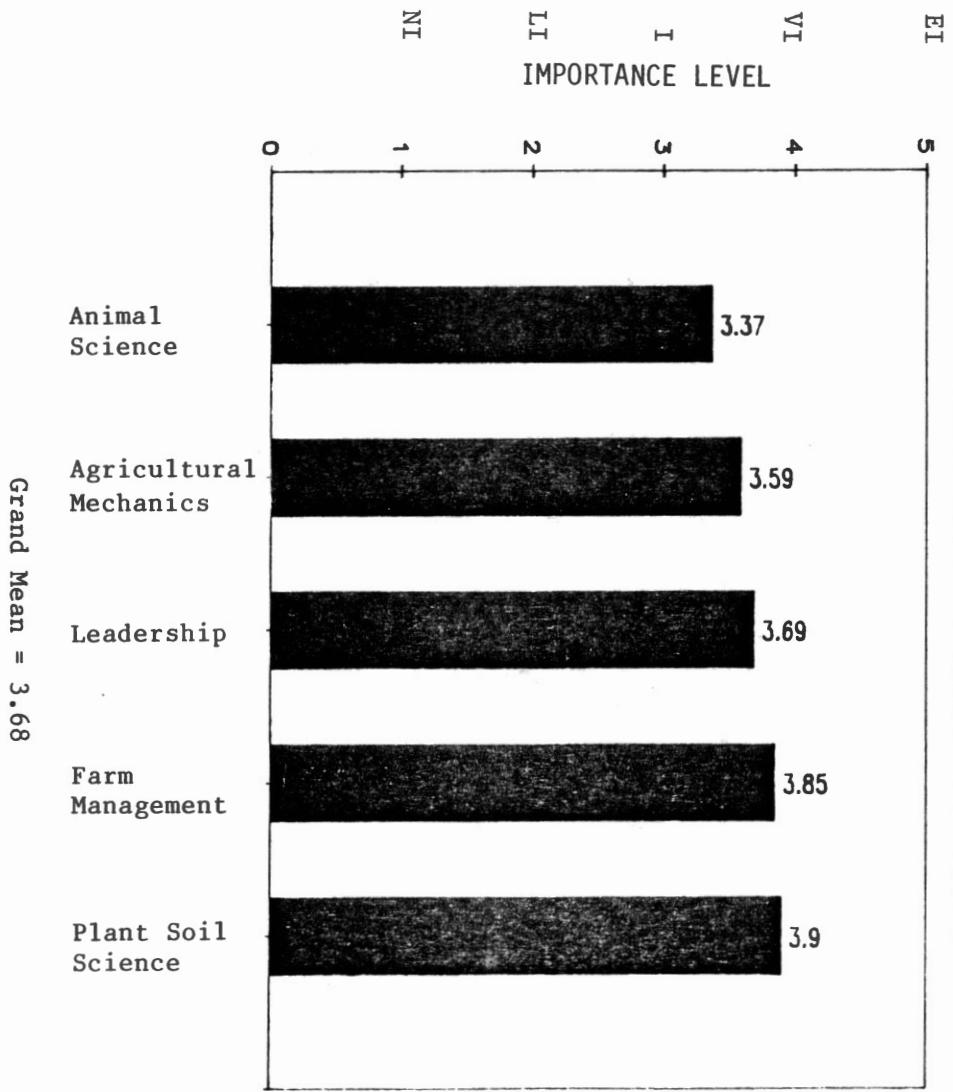
Five areas were listed in the agricultural curriculum model for secondary schools and they are summarized in Figure 8. 'Plant and Soil Science' was indicated by the respondents as being the most important area of the curriculum for secondary schools with an overall mean response of 3.90. 'Farm Management' and 'Leadership' were the two next highest with mean responses of 3.85 and 3.69, respectively. 'Animal Science' presented the lowest mean score with a 3.37 rating. The grand mean score of the curriculum for secondary schools was 3.68, which stays in the category of 'Very Important'.

TABLE XIII
SUMMARY OF LEADERSHIP AREA FOR THE
SECONDARY CURRICULUM MODEL

Leadership	Extremely Important		Very Important		Important		Low Importance		Not Important		Mean	Category
	N	%	N	%	N	%	N	%	N	%		
1. Parliamentary Procedure	10	17.5	20	35.1	17	29.8	7	12.3	3	5.3	3.47	I
2. Public Speaking	16	28.1	12	21.0	21	36.9	4	7.0	4	7.0	3.56	VI
3. Contests	5	8.8	18	31.6	23	40.3	6	10.5	5	8.8	3.21	I
4. General Activities at School	16	28.1	27	47.3	11	19.3	1	1.8	2	3.5	3.95	VI
5. General Activities in the Community	31	54.4	15	26.3	8	14.0	2	3.5	1	1.8	4.28	VI

N=57; Mean of Means=3.69; Extremely Important=5; Very Important=4; Important=3; Low Importance=2; and Not Important=1.

FIGURE 8. IMPORTANCE LEVEL OF THE AREAS FOR THE SECONDARY CURRICULUM MODEL



CHAPTER VI

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents a summary of the major findings related to the purpose and objectives, conclusions, and recommendations based upon the findings.

Summary of the Study

Purpose of the Study

The major purpose of this study was to develop an agricultural curriculum model. The secondary purpose was to verify the importance of this model for rural schools in Northeast Brazil.

Objectives of the Study

In order to achieve the purposes, the following objectives were determined:

1. To examine agricultural curriculum materials from developing and developed countries and verify how these could be applied in Northeast Brazil.
2. To make contact with Technical Agriculture schools in Northeast Brazil for their curriculum and make recommendations.

3. To obtain the judgement of a Brazilian graduate student group majoring in agriculture in United States universities. Those students either have a scholarship from EMBRAPA or CNPq.

Summary of Review of Literature

FAO (1977), and Berstecher (1985) showed that education and rural development are related. Jamison and Lau, cited by Imbia (1987), noted that the better educated the rural population is, the better the results achieved in terms of production, productivity, and income. Consequently, rural people can improve their conditions and their quality of life.

Swanson (1985) and Meaders (1985) showed that the experiences in North American, Europe, Japan, and Taiwan are good examples of preparing technical and managerial skilled workers to succeed in farming.

Developing countries are becoming aware of the need for educating their people. Morton and Tansan (1985) showed that African countries, such as Cameron and Swaziland, have had positive results emphasizing practical education in agriculture.

Dealton and McNamara (1984) said investment in human capital is a fundamental tool for alleviating poverty, promoting citizenship, and changing those institutional structures that block the improving of standards of living.

Haussman and Haar (1978) and Schuh (1970) pointed out that Brazil has been investing in its people at low levels. Schuh (1970), Alves, Teixeira Filho, and Tollini (1985), Spitzer (1981) and Silva (1982) mentioned that rural-urban migration is high and increases the level of unemployment in the urban sector, and also increases problems of health, sanitation, crime, and morality. Rural migrants are not skilled for urban labor markets.

Brazil has a very selective educational system based upon European tradition. McNeil (1970) said that there is also a great educational difference between rural and urban sectors, with rural people coming off much worse. Millions of children are not able to complete their primary education in Brazil. Secondary school in rural areas is another serious problem. Regional differences are noted. IBGE (1984) showed that about 50 percent of Brazilian illiteracy was in Northeast in 1983. Alves (1984) recommended that rural curriculum must be revised.

Curriculum must emphasize society needs, preparing the students to be knowledgeable, skilled, and developing attitudes and values that help them get better jobs and help the society as a whole. Curriculum development needs to be taken from the total culture and the total context of the society, otherwise it will not be responsive in changing knowledge and social personal needs and therefore, will be ineffective.

Beane, Toepfer, and Alessis (1986) pointed out that the identification of a curriculum content involves three issues:

1. Content related to the organization center and to the objectives.
2. Content related to the lives of learners.
3. Content related to its level of difficulty.

Design and Methodology of the Study

In order to accomplish the first objective, agriculture curriculum from developed and developing countries were examined. For developed countries a sample of five American States was used, including the following: Oklahoma, Arkansas, Idaho, Iowa, and California. A letter was sent to forty former international graduate AGED/OSU students requesting their country's

curriculum programs in agriculture. Curriculum from Micronesia, Thailand, Taiwan, Philippines, and Nigeria were received and examined for developing countries. Three similar AGED/OSU graduate studies were also analyzed. Those studies dealt with the agriculture curriculum. The first was conducted for developing countries, the second for Saudi Arabia, and the last for Oklahoma.

The procedure used to accomplish the second objective was to send a letter to National Technical Agriculture School Coordination in Brazil, requesting curriculum and other documents related to the school activities. The documents were received and they presented agriculture curriculum for secondary and a project to implement agriculture courses in primary rural schools in Brazil.

Accomplishing the last objective, a group of eighty-six Brazilian graduate students majoring in agriculture in United States universities was surveyed through a mailed questionnaire. Those students had either a scholarship from EMBRAPA or CNPq during the development of the study. There was a 70.37 percent overall return of the questionnaires. Information obtained from the questionnaire was presented through descriptive statistics.

Findings from Curriculum Materials

Developed Countries

Vocational agriculture education for Oklahoma involves grades 8th through 12th. In general, its curriculum contains areas related to: Orientation, Leadership, Supervised Occupational Experience Programs, Animal Science, Plant Science, Agricultural Mechanics, Finance, Plant and Soil Science, Farm Business Management and Leadership.

Vocational Agriculture I for Arkansas presents units related to: Agricultural Mechanics, Animal Science, Farm Management, and Plant and Soil Science.

Idaho 4th grade agriculture curriculum content presents forty-five units divided in six major areas: Language Arts, Science, Social Studies, Mathematics, Health/Nutrition, and Resources.

The state of California developed elementary curriculum guides for nutrition education curricula with ten sections directly related to a balanced meal.

The state of Iowa developed agriculture curriculum for elementary, junior high and secondary schools. The major sections are: Animal Science, Agronomic Science, Agricultural Mechanics, Farm Business Management, Agricultural Supplies and Services, Agricultural Products Processing and Distribution, Horticulture, Natural Resources and Conservation, and Occupational Experience.

Developing Countries

Eastern Caroline Islands - Federal State of Micronesia

The vocational agriculture program at PICS, in Micronesia offers four courses: Agriculture I - (vegetable production); Agriculture II - (swine production); Agriculture III - (agronomy); and Agriculture IV - (poultry production, meat processing, and farm machinery).

Thailand

Agriculture courses in Thailand are offered for lower secondary schools (grades 7th, 8th, and 9th) and for upper secondary schools (grades 10th, 11th,

and 12th). Curriculum content for lower secondary levels contains: Vegetable, Garden, Ornamental Horticulture, Fruit Farming, Tree Garden, Breeding, Farm Animal Production, Small Animal Production, Medium Animal Production, Large Animal Production, Agricultural Industry, Silkworm Culture, Honey Bee Culture, Mushroom Growing, and Agriculture Technology.

Curriculum content for upper levels presents: Planting Crops, Planting Vegetables, Planting Ornamental Floriculture, Farm Crops, Planting Fruit Trees, Poultry Production, Small Animal Production, Livestock, Aquatic Animal Production, and Agricultural Engineering.

Republic of China (Taiwan)

In general, the core curriculum for vo-ag in Taiwan contains the following major sections: Farm Management, Forestry Agricultural Mechanics Engineering, Rural Housekeeping, and Silkworm culture.

Philippines

Secondary agriculture curriculum in Philippines is part of Home Industry courses and contains: Vegetable Gardening, Poultry, Piggery, and Food Processing.

Nigeria

The agriculture curriculum for Nigeria and other West African countries is presented for their five year secondary school system. In general, their curriculum presents units related to: Plant, Horticulture, Health, Agricultural Mechanics, Farm Management, Agricultural Development, Environment, Soil Science, and Animal Science.

Brazil

An agriculture curriculum for thirty-six secondary schools in Brazil is offered for three years. Basically, the curriculum contains:

Year I - Activities related to horticulture and small animals;

Year II - Activities related to temporary regional crops, medium animals, design and topography;

Year III - Activities related to perennial crops, large animals, irrigation and drainage, constructions and installations, writing and speaking, supervised experience program.

The Ministry of Education is working on a project to implement an agriculture curriculum in elementary rural schools for grades 5th through 8th. The curriculum content presented in the project contains:

- I. Practices in agriculture (vegetable production, annual and perennial crops);
- II. Practices in zootechny (small, medium, and large animals);
- III. Practices in commerce (accounting, commercialization, and bank operations); and
- IV. Industrial practices (industrialization, processing).

Graduate AGED/OSU Studies

The agricultural curriculum model developed by Rafie (1984) for developing countries was considered 'of Moderate Importance' (second highest in his scale of importance) by a group of international students majoring in Agricultural Education in the United States universities. The model presented the following major sections: Soil Science, Plant Science, Agricultural Mechanics, Animal Science, Horticulture, Agriculture Management, Forestry,

Supervised Experience Programs and Record, Environment Protection, Opportunity in Agriculture, and Agriculture Extension.

Barnett (1987) concluded that the instructional areas for eighth graders in the state of Oklahoma should be taught in the following order: 1) Vocational Leadership and Careers; 2) Farm Management; 3) Animal Science; 4) Agricultural Mechanics; and 5) Plant and Soil Science.

The study conducted by Al-Zaidi (1982) presented the agriculture curriculum used in three Saudi Arabia Institutes, with the following six major areas: 1) Agricultural Economics, Rural Sociology, and Agricultural Extension; 2) Plant Production and Protection; 3) Agricultural Mechanics and Soil Science; 4) Animal Production and Food Technology; 5) General Courses; and 6) Summer Internship. Using information provided by administrators, instructors, senior students, and regional directors from those institutes, he concluded that the components of the curriculum in agriculture presented in his study were considered to be either "Important" or "Very Important" by almost all groups.

Findings from the Survey Data

Respondents - Fifty-seven Brazilian agricultural students answered the questionnaire. Fifty-two were male and five female. Agricultural Engineering, Plant Pathology, Agronomy, Animal Science, and Plant Genetics and Breeding were the majors with higher numbers of respondents. Forty-four respondents were working towards a Ph.D. degree, seven towards Post-doctoral studies, and six towards a Masters degree. Twenty-one of the respondents have been involved in agriculture for more than fifteen years. Seventeen of them have been working in agriculture for eleven to fifteen years. Nine respondents have

been involved for six to ten years, and ten respondents have been involved for zero to five years.

The Agricultural Curriculum Model for Elementary Schools

The overall mean for the elementary curriculum model was 3.45, meaning that it is 'Important'. The highest mean for the elementary curriculum was the Nutrition and Health area with 4.13, categorized as 'Very Important'. The other five areas had the following means and categories: Plant and Soil Science 3.52 (Very Important); Agricultural Mechanics 3.37 (Important); Leadership 3.26 (Important); Farm Management 3.24 (Important); and Animal Science 3.17 (Important).

The Agricultural Curriculum Model for Secondary Schools

Secondary curriculum model for secondary schools rated a grand mean of 3.68, indicating that it is 'Very Important'. Plant and Soil Science was the area that scored the highest mean, 3.90 (Very Important). The following three areas stayed in the category of 'Very Important'. Farm Management with 3.85; Leadership with 3.69; and Agriculture Mechanics with 3.59. Animal Science had the lowest mean, 3.37 (Important).

Conclusions

1. Since 77 percent of the respondents participating in this study were working toward a Ph.D. degree, 12 percent post-Doctoral studies, and 11 percent towards a Master's degree, it is concluded that the respondents had a strong academic background.

2. Since the Brazilian government has planned to implement an agricultural curriculum in rural areas for elementary schools, it is concluded that the Brazilian government has a concern about the improvement of the educational system in rural areas.

3. Since the curriculum model presented in this study was considered 'Important' for elementary schools and 'Very Important' for secondary schools, it is concluded that the curriculum should be adapted in rural schools in Northeast Brazil with some modifications.

4. Since the Nutrition and Health area was indicated by the respondents being the most important area for the whole model (elementary and secondary) it is concluded that Nutrition and Health should be included in any curriculum in agriculture.

5. All sections of the secondary curriculum model were rated higher than those in the elementary curriculum model. This might reflect the experience already existent in technical agriculture in the secondary schools in Brazil or it may indicate that some areas need to be reexamined for elementary schools.

6. Since units such as Livestock Judging Selection, Stockshow Rule and Procedures, and Animal Digestion were rated less than 3.00 in the Animal Science area for the elementary schools, it is concluded that those units need to be reexamined.

7. Because units such as Painting, Using a Framing Square, and Welding were rated less than 3.00 under the Agricultural Mechanics area for elementary schools, it is concluded that this area needs more research to verify if the items included are needed or not.

8. Since units such as Animal Judging, Collecting and Examining Semen, Fertility and Pregnancy Testing, and Market Grades were rated less than 3.00 under the Animal Science area for secondary schools and this area had the

lowest mean of means for the secondary curriculum, it is concluded that those units need to be reexamined.

Recommendations

1. It is recommended that opinions of people other than Brazilian graduate students in the United States should be surveyed in order to get additional opinions, compare those opinions and develop the best curriculum.

2. It is recommended that the Brazilian government should provide all kinds of human, physical and financial support needed to implement an agriculture curriculum in the elementary schools in the rural areas in the country.

3. It is recommended that the results presented in this study should be shown and discussed with the Department of Education in each state of Northeast Brazil.

4. It is recommended that areas such as Nutrition and Health should be taught through the agriculture curriculum for elementary schools in Northeast Brazil.

5. It is recommended that more research should be done in order to provide the proper units under the Animal Science and Agricultural Mechanics areas for elementary schools.

6. It is recommended that more research should be done in order to verify if units such as Animal Judging, Collecting and Examining Semen, Fertility and Pregnancy Testing, and Market Grades are needed or not in the secondary school curriculum.

7. It is recommended that more research about an agriculture curriculum for elementary and secondary schools should be done in Brazil in order to provide

better information and to get the right kind of education for those people that need to change their standard of life.

BIBLIOGRAPHY

- Alves, Eliseu R. A. Factors Affecting Dissemination of New Technology in Brazilian Agriculture and Agricultural Research edited by Levon Yeganiantz. Brazilian Agricultural Research Corporation - EMBRAPA. Brasilia, D.F., 1984, 277-307.
- Alves, Eliseu R. A. Teixeira Filho, R. R. and Tollini, H. Demographic Aspects of Agricultural Development: Brazil, 1950-1974, in Brazilian Agriculture and Agricultural Research edited by Levon Yeganiantz. Brazilian Agricultural Research Corporation - EMBRAPA. Brasilia, DF, 1984, 5-60.
- Al-Zaidi, Abdullah A. "Adequacies of Curriculum and Training in Agriculture Provided at Three Saudi Institutions as Assessed by Administrators, Instructors, Senior Students, and Regional Directors." (Unpublished Ed.D. Thesis, Oklahoma State University, 1982).
- Asia and the Pacific Programme of Educational Innovation for Development (APEID). Relevance of Education to Rural Development. Report of a Regional Study Group Meeting. Bangkok, 1985.
- Barnett, William G. "Perceptions of Curriculum and Skills to be Taught to Eighth Grade Students of Vocational Agriculture in Oklahoma." (Unpublished Master Thesis, Oklahoma State University, 1987).
- Beane, James A., Toepfer, Conrad F. Jr., and Alessi, Samuel Y. Jr. Curriculum Planning and Development. Allyn and Bacon, Inc., Newton, Massachusetts, 1986.
- Befecadu, Yoseph. "A Systems Approach to Curriculum Development and Instruction for Occupational Education in Ethiopia." (Unpublished Ed.D. Thesis, Oklahoma State University, 1975).
- Berman, Louise M. New Priorities in the Curriculum. Charles E. Merrill Publishing Company. Columbus, Ohio. 1968.
- Berstecher, D. Education and Rural Development: Issues for Planning and Research. Unesco. International Institute for Educational Planning. Belgium, 1985.
- Birkenholz, Robert. in The Journal of the American Association of Teacher Educators in Agriculture. Vol. 27, No. 1. Spring 1986, 13-17.

- Brown, Lester R. In World Food, Population and Development by Berardi, Gigi M. Rowman and Allanheld Publishers, New Jersey, 1985.
- COAGRI. Diretrizes de Funcionamento de Uma Escola Agrotécnica Federal. Ministério da Educação e Cultura, Brasília, D.F., Brazil, 1985.
- COAGRI. Modelos Básicos Para a Implantação de Escola de 1º Grau de 5ª a 8ª Séries Com Terminalidade em Agropecuária. Ministério da Educação e Cultura, Brasília, D.F., Brazil, Sept. 1986.
- Dairy Council of California. Big Ideas in Nutrition Education and How To Teach Them. California, 1974.
- Deaton, Brady J. and McNamara, Kevin T. Education in a Changing Environment: Impact of Population and Economic Change on the Demand and Cost of Public Education in Rural America. Southern Rural Development Center, Mississippi, February, 1984.
- Doll, Ronald C. Curriculum Improvement: Decision Making and Process. Fifth edition. Allyn and Bacon, Inc. Boston, Massachusetts. 1982.
- Food and Agriculture Organization of the United Nations (FAO). Learning and Living: Education for Rural Families in Developing Countries. Rome, 1977.
- Hausman, Fay and Haar, Jerry. Education in Brazil. World Education Series, Archon Books, 1978.
- Hewlett, Ann S. and Weiner, Richard S. Brazil and Mexico Patterns in Late Development. Institute for the Study of Human Issues, Philadelphia, Pennsylvania, 1982.
- Imbia, Silvester I. "A Study of Cameroon: Agricultural Education Priority Issues." (Unpublished Ed.D. Thesis, Oklahoma State University, 1987).
- Instituto Brasileiro de Geografia e Estatística (IBGE). Censo de 1980. Brasília, DF, 1983.
- Instituto Brasileiro de Geografia e Estatística (IBGE). Anuario Estatístico do Brasil Brasília, DF, 1984.
- Kouzekanani, Kamiar and Miller, Larry. "International Extension Education: Policies and Graduate Study in The Journal of the American Association of Teacher Educators in Agriculture, Vol. 27, No. 1, Spring 1985. pp. 23-29.
- Kutcher, Gary P. and Scandizzo, Pasquale L. The Agricultural Economy of Northeast Brazil. World Bank, The Johns Hopkins University Press, Baltimore, Maryland, 1981.

- McNeil, Malvina R. Guidelines to Problems of Education in Brazil: A Review and Selected Bibliography. Teachers College Press, New York, New York, 1970.
- Meaders, Donald. "Vocational Agriculture Helps Rural Youth: Japan and Taiwan" in The Agricultural Education Magazine, Vol. 57, No. 7, (January, 1985), pp. 10-12.
- National Geographic. Brazil Moment of Promise and Pain. Vol. 171, No. 3, March 1987, 348-384.
- Rafie, Ahmadreza. "Developing a High School Vocational Agriculture Curriculum Model for Developing Countries." (Unpublished Ed.D. Thesis, Oklahoma State University, 1984).
- Robock, Stefan H. The Rural Push for Urbanization in Latin America: The Case for Northeast Brazil. Latin American Studies Center. Occasional paper No. 1., Michigan State University, 1968.
- Robock, Stefan H. Brazil: A Study in Development Progress. Lexington Books. Lexington, Massachusetts, 1975.
- Schuh, Edward G. in Food Aid and Development. Agricultural Development Council, New York, N.Y, 1981.
- Schuh, Edward G. The Agricultural Development in Brazil. PRAEGER Special Studies in International Economics and Development, New York, 1970.
- Silva, Paulo R. Nutricao e Desenvolvimento Economico do Nordeste Brasileiro. Banco do Nordeste do Brasil S.A., Fortaleza, Ceara, 1982.
- Spitzer, Robert R. No Need for Hunger: How the US can help the World's hungry to help themselves. The Interstate Printers and Publishers, Inc., Danville, Illinois, 1981.
- Stenhouse, Lawrence. An Introduction to Curriculum Research and Development. Heinemann Educational Books Ltd., London, 1975.
- Swanson, Burton E. "Serving Rural Youth Around the World" in The Agricultural Education Magazine, Vol. 57, No. 7, (January, 1985), pp. 3-5.
- Taba, Hilda. Curriculum Development Theory and Practice. Harcourt, Brace and World, Inc., New York, 1962.
- Tanner, Daniel and Tanner, Laurel N. Curriculum Development Theory into Practice. Macmillan Publishing Co., Inc., New York, 1975.

Taylor, Philip H. and Richards, Colin M. An Introduction to Curriculum Studies. Second edition. NFER-Nelson Windson, Berkshire, 1985.

Unruh, Glenys G. and Unruh, Adolph. Curriculum Development: Problems, Processes and Progress. McCutchan Publishing Corporation. Berkeley, California, 1984.

Westmeyer, Paul. Curriculum Planning on the Local School District Level - A Guide for Committees or Individuals. Charles C. Thomas Publisher, Springfield, Illinois, 1981.

APPENDICES

APPENDIX A

(LETTER TO FORMER INTERNATIONAL AGED/OSU
GRADUATE STUDENTS)



Oklahoma State University

DEPARTMENT OF AGRICULTURAL EDUCATION
DIVISION OF AGRICULTURE

STILLWATER, OKLAHOMA 74078
AGRICULTURAL HALL 448
405-624-5129

July 5, 1988


Dear

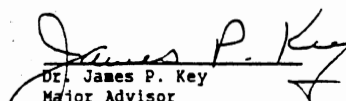
I am a graduate student at Agricultural Education Department at OSU, developing an agricultural curriculum for rural schools in Northeast Brazil.

I would like to receive any agricultural curricula or description of curricula that have been used in any elementary or secondary school in your country. Those curricula would be very helpful in helping me develop an Agricultural curriculum for Brazil.

I would appreciate receiving them from you.

Sincerely,


Maria Gozetti Serpa Braga
Doctoral Student


Dr. James P. Key
Major Advisor



APPENDIX B
(LETTER TO TECHNICAL AGRICULTURE SCHOOLS
IN NORTHEAST BRAZIL)



Oklahoma State University

DEPARTMENT OF AGRICULTURAL EDUCATION
DIVISION OF AGRICULTURE

STILLWATER, OKLAHOMA 74078
AGRICULTURAL HALL 448
405-624-5129

18 de Março de 1988

Senhor Diretor,

Estou cursando o doutorado no Departamento de Educacao Agricola da Universidade do Estado de Oklahoma, nos Estados Unidos. O trabalho de tese que estou conduzindo esta voltado para a problematica rural do Nordeste Brasileiro. Para tanto, objectivo desenvolver um curriculo baseado no ensino agricola e que possa ser utilizado e/ou adaptado aos niveis primario e secundario das escolas localizadas na zona rural da regioao.

Para desenvolver e dar continuidade ao meu trabalho de pesquisa, necessito demasiadamente da colaboracao desta Escola Agricola, no sentido de enviar-me o curriculo adotado por esta unidade de ensino, como tambem relatorios e/ou boletins informativos das atividades desta escola.

Gostaria de receber sugestoes desta diretoria na indicacao de topicos que poderao ser incluidos no curriculo, os quais serao de grande valia para o enriquecimento do trabalho.

A ajuda desta Escola de Ensino Agricola e imprescindivel para a realizacao de meu trabalho. E conto com esta colaboracao, no desejo de amenizar a pobreza absoluta que atinge milhoes de brasileiros que habitam a Regiao Nordeste.

Na certeza de contar com o total apoio desta diretoria, subscrevo-me.

Atenciosamente,

Maria Goretti Serpa Braga
Maria Goretti Serpa Braga

James P. Key
Dr. James P. Key
Professor Orientador



APPENDIX C
(LETTER TO NATIONAL TECHNICAL AGRICULTURE
SCHOOLS COORDINATION IN BRAZIL)



Oklahoma State University

DEPARTMENT OF AGRICULTURAL EDUCATION
DIVISION OF AGRICULTURE

STILLWATER, OKLAHOMA 74078
AGRICULTURAL HALL 448
405-624-5129

30 de Marco de 1988

Senhor Coordenador,

Estou cursando o doutorado no Departamento de Educacao Agricola da Universidade do Estado de Oklahoma, nos Estados Unidos. O trabalho de tese que estou conduzindo esta voltado para a problematica rural do Nordeste Brasileiro. Para tanto, objetivo desenvolver um curriculo agricola que possa ser utilizado e/ou adaptado ao ensino primario e secundario das escolas da zona rural da regioao.

Para desenvolver e dar continuidade ao meu trabalho de pesquisa, necessito demasiadamente da colaboracao desta coordenadoria, no sentido de enviar-me os curriculos das escolas agrotecnicas existentes na regioao nordeste, como tambem relatorios ou boletins informativos das atividades desta coordenacao.

Gostaria de receber sugestoes desta coordenacao na indicacao de topicos que poderao ser incluidos no curriculo, os quais serao de grande valia para o enriquecimento do trabalho.

A ajuda desta coordenacao e imprescindivel para a realizacao de meu trabalho. E conto com esta colaboracao, no desejo de amenizar a pobreza absoluta que atinge milhoes de brasileiros que habitam a Regiao Nordeste.

Na certeza de contar com a total apoio desta coordenacao, subscrevo-me.

Atenciosamente,

Maria Goretti Serpa Praga
Maria Goretti Serpa Praga

James P. Key
Dr. James P. Key
Professor Orientador


CENTENNIAL
DECADE
1980 • 1990

APPENDIX D
(LETTER TO CNPq AND EMBRAPA)



Oklahoma State University

DEPARTMENT OF AGRICULTURAL EDUCATION
DIVISION OF AGRICULTURE

STILLWATER, OKLAHOMA 74078
AGRICULTURAL HALL 448
405-624-5129

May 6, 1988

Dear Sirs:

We need the names, addresses, phone numbers, and majors of the students sponsored by CNPq/EMBRAPA in the United States in order to survey those studying agriculture concerning a proposed curriculum in agriculture for Northeast Brazil. Enclosed is a copy of the mini-proposal submitted by Ms. Braga to her committee for this proposed research study. If you have any questions concerning this survey or study, we will be happy to answer them.

Thank you for your attention to this matter.

Sincerely,

A handwritten signature in cursive script that reads 'James P. Key'.

James P. Key
Professor and Graduate Coordinator



APPENDIX E
(QUESTIONNAIRE)

Please indicate your opinion by circling the number which represents the degree of importance of the CONTENT for an AGRICULTURE CURRICULUM to be taught in RURAL SCHOOLS in NORTHEAST BRAZIL.

I. CONTENT FOR ELEMENTARY SCHOOLS (1st Grade to 8th Grade)

	Extremely Important	Very Important	Important	Low Importance	Not Important
I.1. PLANT AND SOIL SCIENCE					
Importance of Plants	5	4	3	2	1
Crop Production	5	4	3	2	1
Major Crops in Northeast Brazil	5	4	3	2	1
Oil Plant	5	4	3	2	1
Weeds	5	4	3	2	1
Seed Selection	5	4	3	2	1
Planting	5	4	3	2	1
Plants Reproduction	5	4	3	2	1
Insects	5	4	3	2	1
Plant Diseases	5	4	3	2	1
Basic Horticulture	5	4	3	2	1
Study of Soil	5	4	3	2	1
Soil Fertility	5	4	3	2	1
Soil Preparation	5	4	3	2	1
Fertilizers	5	4	3	2	1
Irrigation	5	4	3	2	1
Soil Drainage	5	4	3	2	1
Harvesting	5	4	3	2	1
Storing	5	4	3	2	1
Others (Please list and rate)					
	5	4	3	2	1
	5	4	3	2	1
I.2. NUTRITION AND HEALTH					
General Human Nutrition	5	4	3	2	1
General Health	5	4	3	2	1
Energy and Food	5	4	3	2	1
Nutrients (protein, vitamins, etc)	5	4	3	2	1
Four Basic Food Groups	5	4	3	2	1
Others (Please List and Rate)					
	5	4	3	2	1
	5	4	3	2	1

I.3. ANIMAL SCIENCE

	Extremely Important	Very Important	Important	Low Importance	Not Important
The Importance of Animals	5	4	3	2	1
Livestock Management	5	4	3	2	1
Feeding and Caring for Small Animals	5	4	3	2	1
Feeding and Caring for Medium Animals	5	4	3	2	1
Feeding and Caring for Large Animals	5	4	3	2	1
Animal Nutrition	5	4	3	2	1
Animal Housing	5	4	3	2	1
Animal Digestion	5	4	3	2	1
Animal Health	5	4	3	2	1
Stock Show Rules, Procedures	5	4	3	2	1
Livestock Judging, Selection	5	4	3	2	1
Breeding	5	4	3	2	1
Pastures and Other Forages	5	4	3	2	1
Marketing	5	4	3	2	1
Others (Please List and Rate)					
	5	4	3	2	1
	5	4	3	2	1

I.4. AGRICULTURAL MECHANICS

Agricultural Mechanics	5	4	3	2	1
Tool Identification	5	4	3	2	1
Woodworking	5	4	3	2	1
Carpentry	5	4	3	2	1
Welding	5	4	3	2	1
Small Engines	5	4	3	2	1
Plumbing	5	4	3	2	1
Hardware Identification	5	4	3	2	1
Using a Framing Square	5	4	3	2	1
Farm Safety	5	4	3	2	1
Painting	5	4	3	2	1
Machine Maintenance	5	4	3	2	1
Others (Please List and Rate)					
	5	4	3	2	1
	5	4	3	2	1

I.5. FARM MANAGEMENT

Importance of Farm Management	5	4	3	2	1
Introduction to Accounting	5	4	3	2	1

	Extremely Important	Very Important	Important	Low Importance	Not Important
Bank Operations	5	4	3	2	1
Commercialization	5	4	3	2	1
Weight and Measurement	5	4	3	2	1
Others (Please List and Rate)					
	5	4	3	2	1
	5	4	3	2	1

I.6. LEADERSHIP

Parliamentary Procedure	5	4	3	2	1
Public Speaking	5	4	3	2	1
Becoming a Good Leader	5	4	3	2	1
Everyday Life Skills	5	4	3	2	1
Others (Please List and Rate)					
	5	4	3	2	1
	5	4	3	2	1

II. Please consider these areas from the standpoint of the SECONDARY SCHOOL.

II.1. PLANT AND SOIL SCIENCE

	Extremely Important	Very Important	Important	Low Importance	Not Important
Importance of Agriculture	5	4	3	2	1
Plant Growth	5	4	3	2	1
Plant Nutrients	5	4	3	2	1
Seed Selection	5	4	3	2	1
Planting	5	4	3	2	1
Plant Reproduction	5	4	3	2	1
Weed Control	5	4	3	2	1
Plant Insect Control	5	4	3	2	1
Plant Diseases	5	4	3	2	1
Crop Production	5	4	3	2	1
Marketing Crops	5	4	3	2	1
Horticulture	5	4	3	2	1
Harvesting	5	4	3	2	1
Storing	5	4	3	2	1
Study of Soils	5	4	3	2	1
Soil Conservation	5	4	3	2	1
Soil Fertility	5	4	3	2	1
Soil Morphology	5	4	3	2	1

	Extremely Important	Very Important	Important	Low Importance	Not Important
Erosion	5	4	3	2	1
Soil Sampling	5	4	3	2	1
Irrigation	5	4	3	2	1
Drainage	5	4	3	2	1
Others (Please List and Rate)					
	5	4	3	2	1
	5	4	3	2	1

II.2. ANIMAL SCIENCE

The Importance of Animals	5	4	3	2	1
Using Livestock Products	5	4	3	2	1
The Livestock Industry	5	4	3	2	1
Breeds of Livestock	5	4	3	2	1
Livestock Selection	5	4	3	2	1
Livestock Feeding	5	4	3	2	1
Animal Nutrients	5	4	3	2	1
Animal Housing	5	4	3	2	1
Animal Digestion	5	4	3	2	1
Animal Health	5	4	3	2	1
Diseases of Animals	5	4	3	2	1
Parasites of Animals	5	4	3	2	1
Collecting & Examining Semen	5	4	3	2	1
Artificial Insemination	5	4	3	2	1
Fertility and Pregnancy Testing	5	4	3	2	1
Market Grades	5	4	3	2	1
Marketing Livestock	5	4	3	2	1
Animal Identification	5	4	3	2	1
Animal Judging	5	4	3	2	1
Others (Please List and Rate)					
	5	4	3	2	1
	5	4	3	2	1

II.3. AGRICULTURAL MECHANICS

Farm Safety	5	4	3	2	1
Welding	5	4	3	2	1
Carpentry	5	4	3	2	1
Metal Work	5	4	3	2	1
Plumbing	5	4	3	2	1
Rural Electricity	5	4	3	2	1
Engine Operation	5	4	3	2	1
Rural Construction	5	4	3	2	1
Painting	5	4	3	2	1
Machine Maintenance	5	4	3	2	1

	Extremely Important	Very Important	Important	Low Importance	Not Important
Others (Please List and Rate)	5	4	3	2	1
	5	4	3	2	1

II.4 FARM MANAGEMENT

Importance of Farm Management	5	4	3	2	1
Selecting a Farm	5	4	3	2	1
Managing a Farm	5	4	3	2	1
Using Weight and Measurement	5	4	3	2	1
Others (Please List and Rate)	5	4	3	2	1
	5	4	3	2	1

II.5. LEADERSHIP

Parliamentary Procedure	5	4	3	2	1
Public Speaking	5	4	3	2	1
Contests	5	4	3	2	1
General Activities at School	5	4	3	2	1
General Activities in the Community	5	4	3	2	1
Others (Please List and Rate)	5	4	3	2	1
	5	4	3	2	1

III. PERSONAL INFORMATION:

1. Name _____ Age _____
2. Major _____ Sex _____
3. Degree Searched _____
4. Please Check your birth place:
 - _____ Rural Village
 - _____ Small Town
 - _____ City
 - _____ Other (Please specify) _____
5. Please indicate your agricultural background _____
6. How long have you been involved in agricultural activities?
 - _____ 0 to 5 years
 - _____ 6 to 10 years
 - _____ 11 to 15 years
 - _____ More than 15
7. General Comments _____

APPENDIX F
(COVER LETTER)



Oklahoma State University

DEPARTMENT OF AGRICULTURAL EDUCATION
DIVISION OF AGRICULTURE

STILLWATER, OKLAHOMA 74078
AGRICULTURAL HALL 448
405-624-5129

September 2, 1988

Dear

I am a Brazilian graduate student working for my doctoral degree in Agricultural Education at Oklahoma State University.

The study being conducted is to determine whether or not an Elementary Agricultural Curriculum model and a Secondary Agricultural Curriculum model developed by the researcher are important for rural schools in Northeast Brazil.

As a Brazilian graduate student with knowledge about our country's agricultural conditions, your information will be very helpful in achieving the study objective. Please take about a few minutes to answer the attached questionnaire and return it immediately. By answering the questionnaire you will make a tremendous contribution to the Educational Program for the Northeast agricultural sector of Brazil and more importantly you are helping to improve rural people's lives and promote the rural development in our country.

I will be glad to send you a copy of the findings if you would like. If you have any questions, please call 405-744-8139.

Thank you for your cooperation.

James P. Key
Dr. James P. Key
Major Advisor

Maria Goretti Serpa Braga
Maria Goretti Serpa Braga
Doctoral Student



APPENDIX G
(FOLLOW-UP LETTER)



Oklahoma State University

DEPARTMENT OF AGRICULTURAL EDUCATION
DIVISION OF AGRICULTURE

STILLWATER, OKLAHOMA 74078
AGRICULTURAL HALL 448
405-624-5129

September 14, 1988

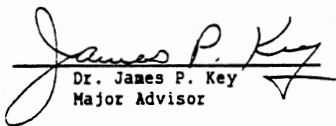
Dear

Two weeks ago you were sent a questionnaire seeking your opinions and suggestions on the degree of importance of an agricultural curriculum model for rural schools in Northeast Brazil. Because your opinion is extremely important on this subject matter, you were selected as a part of the survey sample.

If you have already answered and returned the questionnaire to us, please accept our sincere thanks. If not, please answer it today. Your response is very important to the rural education and rural development in Northeast Brazil.

If you have any questions please call (405) 744-8139. I hope to hear from you very soon.

Sincerely,


Dr. James P. Key
Major Advisor


Maria Goretti Seppa Braga
Doctoral Student



APPENDIX H
(COMMENTS AND SUGGESTIONS OF THE
RESPONDENTS)

COMMENTS OF THE RESPONDENTS

1. "I believe that your study is valuable not only for Northeast region, but also for other Brazilian regions."
2. "I congratulate you and Dr. Key for having chosen so important matter as your research subject during your doctoral course. Northeast Brazil situation is certainly one of the biggest obstacle to be overcome on the way of a developing Brazil and an effective agricultural program would do that for sure."
3. "As a professor I consider that all activities related to education, especially educational programs, should be encouraged considering that Brazil has tremendous economics and social differences. You are on a good way. Go ahead! Congratulations."
4. "... you should ask those questions based on the necessities of the people who lives there (Northeast)."
5. "Concerning rural school curricula mainly in Northeastern Brazil, there are a lot of basic gaps to be filled out."
6. "I'm originally from Sao Paulo state, where I got my elementary and secondary education. There we had many rural schools with a basic agricultural curriculum. I studied in one of them. I think this is a good idea. I think you should reinforce agricultural practices in our rural schools."
7. "This program would be extremely educated."
8. "I agree in an agriculture education for rural areas, but it should be planned as an extension of the present curriculum. . . we still have vestibular and generally rural students have difficulties in passing in that exam."

9. "I'd like to say that this is an important work, which I'd like to see being implemented in our schools. . . , but not only rural should be included.."
10. "I think that a great concern with the environment is needed. . . part of the problem faced by Brazilian Northeast today is a heritage of land and resources mismanagement."
11. "Would be interesting consult secondary agriculture teachers in Brazil. They have more concern about curriculum. I don't think the region will determine big changes in the curriculum."
12. "I believe that an agricultural curriculum model is very important for rural schools in Brazil. It will create an agricultural consciousness among young people and probably will keep more people in rural areas, contributing to the development of our country."
13. "I think that for the secondary course the focus of activities should be related to practical work (farm-school)."
14. ". . .curriculum should have a vocational element through practical activities and consider the cultural and material reality of the community."
15. "This is a good idea. I hope that its results contribute to improve the conditions of those people that live in Northeast Brazil."
16. "Hope those answers can provide you insights of what could be important in our education system to help people understand how important agriculture and related sectors are."
17. "You should have included something on the importance of local resources and local cultures (costumes)."
18. "For improvement of Northeast Brazil three elements are important: small irrigation projects, improvement in the standard of higher education, and small industry scales."

19. "I think that the major problem in the agriculture of Northeast Brazil is political decision and responsibility without what the region agriculture can not lift-off. Before anything else, there must be a serious compromise with the region if anyone really wants to solve the problem."
20. "Excellent proposal of work which results could be a mark in rural education of Northeast Brazil."

SUGGESTIONS OF THE RESPONDENTS

The following are items suggested by the respondents to be included in elementary and secondary agriculture curriculum.

Elementary Schools

Plant and Soil Science - Erosion, Commercialization, Economic Aspects, Vegetable Production, Domestic Garden, Ecology of Plants, Food Processing, Agriculture Industry, Water and Soil Conservation, Water Resources, Development Drought Resistant Crops, New Crops for Arid Land, Colonization of Northeast, Portuguese, and Improvement of Forests.

Nutrition and Health - Seasonal Substitute Food, Eating Habits, Sanitary Science, Enjoy Eating, Food Preparation for Human Consumption, Hygiene, Sexual Education, First Aid, Vaccination, Family Plan, Principles of Food Conservation, and Basic Health Care.

Animal Science - Veterinary Hospitals, Animal Sanitation and Human Related Diseases, and Wildlife.

Agricultural Mechanics - Tool Workshop Facilities, Irrigation Procedures, Use of Small (cheap) Agriculture Implements, Use of Animals in Agriculture Work, and Wood House Constructions.

Farm Management - Rural Credits and Human Resources.

Leadership - Organization of Children 10-20 years old with Political and Social Directions, Community Organization, Extension Programs, Private Associations, and Social Development of Northeast.

Secondary Schools

Plant and Soil Science - Importance of Forests, Ecology, Water Captation, System of Land Tenure in Northeast, Water Conservation, Conservation of Biological Diversity, Water Quality, Salinity Control, Water Contamination, General Soil Microorganism, Technology of Agricultural Products, Management of Soil, Climatology, and Pollution in Agriculture (chemicals).

Animal Science - Practical Observations, Vaccinations, and Veterinary Hospitals.

Agricultural Mechanics - Workshop Facilities, Machines Drawn by Animals, Identification of Cheap Materials for House Construction, and Tractor Driving Skills.

Farm Management - Land Reform and Principles of Farm System.

Leadership - Government policies for the Development of Northeast, Rural Cooperatives, Rural Clubs, Development Projects in the Community, Organization of Clubs with Social and Political Objectives, and Agriculture Extension.

VITA

Maria Goretti Serpa Braga

Candidate for the Degree of

Doctor of Education

Thesis: DEVELOPING AN AGRICULTURE CURRICULUM MODEL FOR
RURAL SCHOOLS IN NORTHEAST BRAZIL

Major Field: Agricultural Education

Biographical:

Personal Data: Born in Maranguape, Ceará, Brazil, August 27, 1951, the daughter Mr. José Oriá Serpa and Mrs. Maria Alice Serpa. Married Raimundo Braga Sobrinho on December 15, 1977, with two daughters, Ana Cecilia and Alice.

Education: Graduated from High School at Colégio Juvenal Carvalho and received the Certificate of Elementary Teacher, Fortaleza, Ceará, Brazil, 1970; received Bachelor of Economics Science degree from the College of Economics, Ceará Federal University, Fortaleza, Ceará, Brazil, December 1975; received the Master of Science degree in Economics from Paraíba Federal University, Campina Grande, Paraíba, Brazil, 1985; completed requirements for the Doctor of Education degree in Agricultural Education in December, 1988 at Oklahoma State University.

Professional Experience: Elementary teacher at Colégio Juvenal Carvalho, Fortaleza, Ceará, Brazil, 1971-1973; scholar at Bank of Northeast Brazil S/A (BNB), Fortaleza, Ceará, Brazil, 1974-1975, in the Coordination of Planning; Economics assistant at Cooperativa Agrícola de Itapagé LTDA, Fortaleza, Ceará, Brazil, 1975-1977; Assistant Professor at Federal Paraíba University, Department of Economics and Finances, Campina Grande, Paraíba, Brasil, 1978 to present.