

AN ABSTRACT OF THE THESIS OF

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(Name of student) (Degree)

in Agricultural Education presented on August 23, 1973  
(Major) (Date)

Title: A NEW PROGRAM OF AGRICULTURAL EDUCATION FOR  
KWARA STATE HIGH SCHOOLS - NIGERIA

Abstract approved: Redacted for Privacy  
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The problem basic to this study was the evolution of an agricultural education program which will take cognisance of the rapid changes in Kwara State community, and which will equally generate the interest of both students and parents in the subject. These factors did not seem to have been considered in preparing the current programs.

The purposes of this study were:

1. To evolve a program of agricultural education which will among other things, attempt to prepare the Kwara State high school students for the agri-industrial businesses of the state.
2. Propose a model agricultural education advisory committee for the state.
3. To put forward an outline of an in-service training program

which will attempt to play the dual roles of:

- a. serve as an incentive to the agricultural science teachers.
- b. improve their professional competence.

In developing this program the following procedures were considered relevant and were therefore employed.

1. A survey of the agri-businesses of Kwara State was made. This was done to help prepare those majoring in agricultural education for the jobs, thereby opening their eyes to the world of work in the subject and at the same time attempting to insure competent personnel for the agri-industries.
2. A model agricultural education advisory committee which embraced the cross-section of the agricultural concerns in the state was also put forward. This was to facilitate community participation in the program.
3. Comprehensive in-service training programs were also submitted, in an attempt to serve the interests of all those who may be concerned with agricultural education.
4. Programs of agricultural education in the United States of America and in Nigeria were analyzed and collated. The motive was to adopt suitable practices in the agricultural

education programs of the former to effect an improvement in the programs of the latter country.

At the tail end of chapter four of this study, recommendations were suggested, which when implemented may in the writer's opinion, result in accelerating the development of agricultural education in Kwara State's high schools.

A New Program of Agricultural Education  
For Kwara State High Schools - Nigeria

by

Yusuf Alhaji Alaiya

A THESIS

submitted to

Oregon State University

in partial fulfillment of  
the requirements for the  
degree of

Master of Science

June 1974

APPROVED:

Redacted for Privacy

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Date thesis is presented August 23, 1973

Typed by Ilene Anderton for Yusuf Alhaji Alaiya

## ACKNOWLEDGEMENTS

I am deeply grateful to Dr, Philip Davis, who played the dual roles of a father and an adviser, to Dr. Curt Lowen, a teacher who turned a personal friend, and to Dr. Marvin Durham, who has shown great concern for me since I stepped into this university. Certainly, without the help and guidance of these men of good will, it is doubtful if this program would have ever taken off, let alone been completed.

My deep appreciation also goes to the African American Institute who sponsored me for this program. In particular, I shall never forget Miss Cynthia Wise, my program officer, who became a very dear blood sister to me, through her many acts of kindness. It is my honest prayer that the friendly relationship between this great nation and Nigeria continues to grow from strength to strength.

Equally, I am highly indebted to the Kwara State Ministry of Education for nominating me for the program.

Other Nigerians who helped particularly in writing comments which aided me in my thesis are the Chief Local Education Officer Ilorin, Mr. Y. A. Folorunsho, the agricultural science teachers for Ilorin G. S. S., Mr. Aina, for Okene T. T. C. Mr. Ajayi and for Omu Aran G. S. S.

I promise to live up to expectations.

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## A DEFINITION OF TERMS

A definition of terms is listed to facilitate the understanding of terms used in this study.

Moor Plantation - A location in Ibadan the capital town of the Western State of Nigeria, where personnel are trained for various branches of agriculture.

Rural Education Centre - A now defunct institution in the former northern region of Nigeria, where specialist teachers were produced to teach agricultural science at the primary and the post-primary schools.

Rural Science - A now obsolete term formerly used to denote agricultural science.

NCE - An abbreviation for Nigerian Certificate in Education. The certificate/diploma is usually awarded to the high school and post high schools' graduates who have successfully completed a three year intensive but non-graduate academic and teacher training programs in their field.

Advanced Teachers College - An institution training high and post high schools graduates to become specialist teachers in their various majors in high schools and in other post primary institutions.

Agricultural Education Curriculum - A compilation of planned and unplanned experience designed to assist students studying agricultural subjects.

Agricultural Education Programs - A term which embraces all activities aimed at promoting agricultural education in schools. Although the term is sometimes used loosely to connote agricultural education curriculum, it transcends this to include other aspects, like the training of agricultural education teachers, the Young Farmers Club and the Agricultural Education Advisory Committees.

Ministry of Education - That branch of a government which is solely responsible for the formal education of the people under the government.

Naira - Nigerian currency. One naira is about 1.6 American dollars.

Ground Nut - Peanut.

Maize - Corn.

Cassava - Tapioca.

# A NEW PROGRAM OF AGRICULTURAL EDUCATION FOR KWARA STATE HIGH SCHOOLS - NIGERIA

## I. INTRODUCTION

Whatever thy hand find to do,  
Do it with thy might -- Arabian proverb.

Agricultural Science is not a new thing in Nigeria. From the colonial era, the subject had been vaguely taught under the name of Nature Study. Later on it changed to Farming and Gardening.

However, with the increasing awareness of the country's economy being dependent on agriculture, the need to emphasize agricultural education in schools became greater. A number of grade two teachers were selected for training at Ibadan Moor Plantation in the then Western Nigeria. One of the early graduates of that institution, Mallam Issa Ileko (now Alhaji Issa Ileko) came to teach Agricultural Science under the name Rural Science at the former Ilorin Middle School, for the first time in 1951. Within a short time, Rural Science was introduced into the curriculum of most of the teachers' training colleges in the now defunct Northern Nigeria.

Soon it dawned on the government that nothing short of employing specialist teachers to handle the subject at the primary school level could fulfill its aspiration to fully exploit the agricultural potential of the country. Thus the establishment of Rural Education

Centres was included in the country's ten year development plans launched on the first of April, 1946 (22:71). Consequently a Rural Education Centre was established at Bauchi in the former Northern Nigeria in September 1953. Similar institutions were established at Asaba and Owerri in the former Western and Eastern Nigeria respectively. The Bauchi Rural Education Centre was to give specialist training to a number of selected grade two teachers, to enable them to handle rural science effectively in the primary schools. This introduction of rural science to the primary schools and its handling by a specialist teacher, ushered in an era of positive approach to the treatment of rural science in the country. However, the yearly output of rural science teachers from the Bauchi Rural Education Centre was inadequate to meet the ever increasing demand for the rural science teachers, due to the accelerated expansion of primary schools. Thus within a decade of the establishment of Bauchi Rural Education Centre, another one was established at Minna in the same region.

Within five years of the establishment of the latter institution, it had started producing grade one teachers to replace, for the most part, the expatriate officers, who had been handling the subject in the teachers' training colleges. To accelerate the production of the rural science teachers still further, some of the former graduates of Bauchi Rural Education Centre were selected for further training

in Britain. As an incentive more than anything else, these teachers, on their return to the country, were appointed Education Officers. September 1964 still marked an important turning point in the history of the subject. A special rural science department headed by a Nigerian, Mr. J. O. Komalafe, was opened at the advanced teachers' college, Zaria. The aim was to train mostly those teachers who had had their grade one teacher's certificate for a further two years to increase their competence. With the creation of states in Nigeria on the 27th of May, 1967, the responsibility to educate its citizens devolved to a greater measure on each state. Since then Kwara State Government has been making tremendous progress in all spheres of education. In the writer's opinion, however, the most outstanding achievement of the government was the introduction of agricultural science in all its secondary schools sometime in 1971. (The Ministry of Education circular No. F 201 of the 10th of May 1972). Although lack of adequate trained specialists and money seem to be militating against the government effort, the able leaders in the state's Ministry of Education are doing a fine job with the agricultural education program. An example of the ministry's positive effort was the allocation of a separate fund for agricultural education departments in some secondary schools this year, instead of making it dependent on the schools' general vote.

### Statement of the Problem

Although the Kwara State Ministry of Education is quite dynamic in encouraging agricultural science in its primary and secondary schools, certain defects appear glaring in the present program.

These are:

1. Failure to take the agri-industrial businesses of the state into consideration when preparing the program.
2. Lack of any established competent body to advise the Ministry of Education on its agricultural science programs.
3. Lack of training opportunities for the agricultural science teachers beyond N. C. E. level.

### Analysis of the Problem

At present, unemployment is facing the nation at an alarming rate. The situation is continuously being aggravated by the mounting cases of school drop outs. Whilst socio-economic factors are in part responsible, the sharp pointed conical structure of our educational pyramid appears to be the main cause. In Nigeria today there are over 15,000 primary schools, attended by more than 3,000,000 pupils, 350 teacher training colleges with about 32,000 students, 1,300 secondary modern and grammar schools with about 180,000 students, and five universities with over 7,000 undergraduates.



Even when about 10,000 students attending overseas institutions are included, the percentage of those children who started primary schools that normally enter universities is a drop in the ocean (10, p. 6).

Since the increase in the number of post primary institutions will not be able to cope with the situation, the Kwara State government, like the other state governments in the federation, is grappling with the problem by encouraging the establishment of more industries. Most of the present industries are agri-oriented. Furthermore, a great percentage of both parents and students fail to grasp the right concept of what agricultural science is out to achieve. And, unless opportunity for further training is made available for the agricultural science teachers holding N. C. E., the majority of them may come to look on their jobs as blind alleys.

#### Purpose of the Study

The main purpose of the study is three-fold:

1. To evolve a program of agricultural education which will among other things, prepare the Kwara State high school students for agri-industrial businesses of the state.
2. To propose a model agricultural education advisory committee for the state.
3. To put forward an outline inservice program, to serve

Table 1. Ratio of primary school leavers in Kwara State to be admitted to the post primary institutions. <sup>a/</sup>

Year	Population	No. for admission to post primary	Enrollment ratio
1969	12,860	1,792	13%
1970	13,265	1,980	15%
1971	13,896	2,363	17%
1972	33,293	4,329	14%
1973	19,791	4,531	23%
1974	21,715	5,700	25%
1975	23,915	5,980	25%
1976	27,000	6,750	25%

<sup>a/</sup> Reference 17, Appendix B.

as an incentive and also to improve the professional competence of the agricultural science teachers.

### Assumptions

There are four basic assumptions:

1. That the data used in this study are valid in terms of the goals.
2. That the materials from which the data were collected are official documents and publications from the United States and the Nigerian governments, or their agencies.
3. That the enthusiasm of the Kwara State government in promoting agricultural education in schools will continue unabated.
4. That the involvement of the local farmers and businessmen will help to acquaint the public with the purpose of the agricultural science programs, and that in turn they will give their full support to the programs.

### Procedures

1. Make a general survey of all the agricultural-oriented vocations and institutions offering agricultural courses within Kwara State, to determine what the program should cover.
2. Compare the current Kwara State agricultural education

syllabus with some in the United States to determine their suitability to their areas,

3. Evaluate the present inservice training programs for the agricultural science teachers.

### Limitations

The following factors limit the scope of this study:

1. All high school students offering agricultural science at the school certificate level in the country take the same final examinations. Whereas, this study is restricted to Kwara State alone.
2. Developing the materials from the distance.

Factors limiting the applicability of the study are:

1. Finance.
2. Shortage of trained agricultural education graduate teachers.

### Background of Nigeria

Nigeria, a former British colony in West Africa, lies within the tropics between latitudes 4° and 14° north of the equator, and longitude 3° and 14° east of the Greenwich Meridian. It is bounded on the west by the Republic of Dahomey, on the north by Niger Republic, on the northeast by Chad Republic, on the east by the Republic of Cameroun, and it is washed on the south by the Atlantic Ocean.

The country, which has an area of 356,669 square miles, is well watered by the Rivers Niger, Benue and their tributaries. Its climate varies from tropical at the coast to subtropical further inland. There are two well marked seasons, the dry season lasting from November to March and the wet season from April to October. Temperatures at the coast seldom rise above 90° F. but humidity is high. The climate is drier further north, where extremes of temperatures are common, sometimes reaching as high as 110° F. and falling to 50° F.

Nigeria is a heterogenous state with a population of above 60 million, made up of a large number of ethnic groups. Chief among them are the Hausas, the Fulanis, the Yorubas, the Ibos, Edo, Effik, Ijaw, Tiv, Kanuri and Ibiobio (10, p. 2).

#### Kwara State

Kwara State, in common with the other eleven states, came into being on the first of April, 1968, following the creation of states on May 27, 1967 by the federal government. Because of its unique geographical position, the state is usually referred to as the gateway to the north and south of the country. It has an area of about 28,672 square miles and a population of about 2-1/2 million. Ilorin with a population of about 300,000 is the state capital.

Kwara State has an international border with Dahomey and

shares common boundaries with five sister states, North West and Benue Plateau to the north, Western, Midwestern and the East Central State to the southeast.

Rainfall varies from heavy in the southern fringes of the state to light in the north. The vegetation follows the rainfall pattern, with thick woods in the south, thinning out into grassland in the northern perimeters of the state. The temperature is generally mild.

Dotting the state all over are a number of industries and tourist attraction centers. Thirty-six percent of the children of school age in the state attend primary schools (18, p. 2).

#### Agricultural Education

Nigeria is an agricultural country. About 80% of her working population is engaged in producing yams, cassava, plantains, rice, beans, sugar cane, sorghum and corn for food, and cocoa, oil palm, rubber, groundnuts, cotton and timber for exports. Until recently over 80% of the cost of all imported goods was met with the income derived from farming and forestry activities (10, p. 6).

Although at present more foreign exchange earnings are derived from mineral oil than from all the agricultural products put together, yet since oil is an exhaustible source of revenue, the government is still forging ahead with its ambitious agricultural programs. Agricultural institutions to produce field staff are

springing up by leaps and bounds; so also are research stations.

But the government realized that no amount of expert advice will produce miracles in a population of illiterate peasant farmers.

Thus all the state governments in the country, especially Kwara State government, are pursuing agricultural education programs in their schools vigorously.

## II. REVIEW OF LITERATURE

Each community must be systematically studied in order that a program of agricultural education "tailor-made" for that community may be developed. -- Herbert M. Hamlin, 1950 (12, p. 40).

### Curriculum and Purpose

Dr. Case, in one of his lectures at Zaria Advanced Teachers College in Nigeria, had the following paraphrased statements on the school curriculum in general:

A curriculum is a plan design which reflects the needs of the nation, the community and the child.

Therefore whilst the education curriculum in communist countries reflects communism, it is democratic in outlook in democratic countries. In ancient Greece, the Spartans placed much emphasis on a strong muscular body. Athletics then became highly pronounced in their school curriculum. Similarly, at a certain time in England when there were many road casualties, traffic was included in the school curriculum. In Nigeria we see that agricultural education is gaining more and more prominence in the school curriculum.

There are two extreme assumptions as to what should be the basis of the curriculum. One school of thought believed that it should be based on subjects, whilst the other believed that it should be based on the past experiences of the child. The proponents of the subject-centered curriculum claimed that the method of breaking up the curriculum into subjects was logical. It was backed up by



tradition and it was easily understood by parents. Those who supported the view that it should be child centered contended that the method was psychologically sound and that it placed emphasis where it truly belonged. Between these two extremes lie those who believed that the curriculum should be based on broad areas of subjects. Geography, history and civics could be grouped under the heading "Social Studies." Reading, spelling, grammar, composition, writing and speaking should be grouped under the heading "Language Arts."

Whatever is the case, the curriculum should satisfy the following:

1. Assist the child to see the past in relation to the future.
2. Equip the child with the necessary need for modern living.
3. Keep the child a fully integrated member of the community.
4. Be in line with the current need and the aspiration of the nation.

Thus it is obvious that three elements, the nation, the community and the child form the frame-work of any curriculum (5, p. 19-20).

Dr. Theodore Hildreth Eaton of the Columbia University (1917) in his book, "Columbia University Contributions to Education," once enunciated, "Agriculture in schools should be a curriculum rather than a course"(9, p. 2). This in essence, in the writer's

opinion, means that any sound agricultural education program should echo the aspiration of its immediate community in particular and that of the nation in general.

In support of the above, the preamble of the United Nations Educational, Social and Cultural Organizations may perhaps be paraphrased, "It is in the minds of men that agricultural improvement or deterioration begins, and it is in the minds of men that the basis for sound agricultural and country life must be erected" (12, p. 62). This, in the writer's opinion, also emphasises the need to consider the community first and foremost in planning an agricultural curriculum.

John I. Goodlad et al.(1966) writing on the curriculum once said,

The curricula of our schools and colleges have always been in a process of change, but the change usually hasn't been fundamental. New content was added, some old materials discarded. Sometimes whole courses disappeared and were replaced. But more often than not, the new courses looked much like their predecessors. The gradual process of curriculum change tended to reflect the relatively gradual evolution of society itself (11, p. 9).

Renta Von Stoephasius et al.(1966) writing on the need for a sound vocational oriented curriculum enuciated,

Whilst new communities were springing up, old values were crumbling. Job opportunities took young couples away from familiar haunts to challenges they had not faced before. A new kind of unemployment appeared, unemployment in the midst of plenty because of job

obsolescence. Very little was 'for sure' (11, p. 12).

Lloyd J. Phipps, an authority on agricultural education (1965) had this to say on agribusiness oriented program,

Our society is becoming increasingly dependent on those agriculturally oriented businesses necessary for the efficient and effective supply of food and fiber products, for the exploding population. Many workers in these agriculturally oriented businesses need vocational education in agriculture of special types, if they are to make maximum contribution to the economy of the nation (30, p. 4).

The American public has been historically concerned with agricultural education. There has been a growing sense of its critical importance. It is viewed as a means of helping individuals to help themselves and developing citizens concerned about public welfare and able to contribute to it - Hamlin (1966) on community oriented program of agricultural education (14, p. 4).

The precedings are the views of authorities on agricultural education in particular and educational curriculum, in general. The views expressed range from those on the broad educational curriculum to those which were narrowed down for specificity on agricultural education program. However, the divergent views seem to be convergent in one respect, that the curriculum plan on any subject or group of subjects should be consistent with the general philosophy of education. That is according to Plato, "To equip students to go through life fully and be of help to himself and an asset to the community of which he is a bonafide member" (3, p. 26).

Lloyd Phipps (1965) seemed to sum up what should be the ideal philosophical basis of agricultural education programs as it related

to the general education curriculum study, when he proposed that,

Agricultural Education is an integral part of public school education and contributes to the general objectives of education. It contributes to the development in students of the ability to think and study and the ability to solve problems efficiently, which requires skill in collecting and interpreting data. Public school agricultural education also aids in the development of desirable attitudes and interests and in the development of social sensitivity and resourcefulness of students (30, p. 10).

#### Curriculum for Agricultural Education in U. S. A.

Agricultural education is a relatively new addition to the program of public schools. The best known type of agricultural education in the public schools is vocational education for farming. The first courses taught were academic, non-vocational courses. Thirty states had instigated agricultural courses in their public schools prior to 1917 when the Smith-Hughes Act was passed. The Smith-Hughes Act provided funds to promote vocational education in agriculture for present and prospective farmers. The funds provided had to be matched by local and state funds. The Smith-Hughes Act and subsequent acts were very effective in promoting the establishment of courses of vocational education for present and prospective farmers. At present more than 10,000 school systems in the United States provide this type of agricultural education. The vocational education in agriculture program has been so successful that it has overshadowed other types of agricultural education (30, p. 1).

However, the traditional method of designating the vocational courses in agriculture limited to crops and soils, livestock, farm management and farm mechanics has disappeared or is rapidly disappearing in the U. S. There is a desirable trend toward the offering of broader courses in agriculture at the high school level to meet the increasingly diverse needs of the students. A quick glance at the agricultural education programs for some high schools also shows that they are community-oriented,

Agricultural Education Program - Cascade High School,  
Turner, Oregon

The agricultural education curriculum is based on the Oregon's Agriculture Cluster guide. After inventorying the Oregon Cluster guide, the instructional staff evolved a curriculum which takes into account the agricultural activities of the school district. Thus row crops like sweet corn and beans (peas) which feed the local canning industry were emphasized. Equally emphasized was Ornamental Horticulture. Beef cattle was more stressed than any other livestock. This, however, does not tantamount to the preclusion of other areas of agricultural education, as will be seen in the diagram to follow at the end of this discussion (Figure 1).

To reinforce classroom instruction, opportunity for work experience is also provided. Students involve themselves in some sort of agricultural related occupations. And for this they earn school credits.

<u>8th</u>	<u>Freshmen</u>	<u>Sophmores</u>	<u>Juniors</u>	<u>Seniors</u>	<u>Post High School</u>
	Ag Cruise 9 wks.	Plant and Animals Science - FFA Sup. Exp. Program	Ornamental Horticulture FFA - Sup. Exp. Program		
			Ag III F. F. A. S. Exp. Prog.	Ag IV F. F. A. S. Exp. Prog.	Coop. Work Exp.
			Ag IV F. F. A. S. Exp. Prog.	Ag IV F. F. A. S. Exp. Prog.	Coop. Work Exp.
				Inst. Exchange	
	Principles of Ag F. F. A. S. Exp. Pro. (Full year)	General Shop	Welding Ind. Mech. Cluster Ind. Mech. Cluster	Ind. Mech. Cluster	Coop. Work Exp.
					Agriculture Occupation Community College or another Post High School Training

Figure 1. Cascade Union High School flow chart for agriculture students 1972-73.

### Curriculum at Lebanon High School, Lebanon, Oregon

The economy of Lebanon School District is based largely on farming and lumber industries. The area is also moving toward becoming a bedroom community for the existing metal industries to the north at Albany. Hogs and beef cattle represent the livestock on the curriculum. Agricultural mechanics is also included; so also is Ornamental Horticulture. To reinforce the classroom instruction, supervisory farm experience is provided. The course is provided for a duration of four years. The agricultural project is supported with the local, the state and the federal funds. The model for the curriculum development is the Oregon's Occupational Cluster (19, p. 13).

### Curriculum for Agricultural Education in Nigeria

#### Scheme of Work in Agricultural Science - Year I

1. Introduction to agriculture - how it began and advantages.
2. Farm tools and their uses.
3. The school compound flowers and hedges -  
shade trees.
4. Parts and functions of a typical plant. Forests of Nigeria.
5. Composition and properties of the soil.

Vocational  
Agricultural  
Mechanics AB  
(2 hr)

Vocational  
Livestock  
Technology

Vocational  
Horticulture  
AB

Vocational  
Forestry  
AB (2 hr)

Vocational  
Agricultural  
Management  
AB

Courses not taken  
in 11th grade can  
be taken in the 12th

Vocational  
Agricultural  
Mechanics  
AB (2 hr)

Vocational  
Livestock  
Technology  
AB

Vocational  
Horticulture  
AB

Vocational  
Forestry  
AB (2 hr)

Vocational  
Agricultural  
Management  
AB

Vocational  
Agricultural  
Production  
AB

Vocational  
Agricultural  
Principles  
AB

Figure 2. Lebanon High School vocational agriculture chart.



6. Agricultural Systems: Shifting cultivation, rotation of crops, mono cropping, mixed cropping, mixed farming.
7. Nigerian crops.
8. Livestock - keeping of poultry.

#### Scheme of Work in Agricultural Science - Year II

1. The meaning and importance of agriculture. This should include a discussion of the importance of agriculture to man generally and its role in the economy of the relevant West African country.
2. Farm Management.
3. Composting, farm yard manure, cover crops and green manure.
4. Crop rotation - conservation of soil fertility.
5. Farm animals, purpose of their production and their economic value.
6. General management, feeding and breeding of rabbits and poultry.
7. The school compound flowers and hedges.
8. Making of vegetable beds and care of the vegetables.

#### Scheme of Work in Agricultural Science - Year III

1. General principles of land use (in relation to the use of

land for agriculture, forestry and wild life conservation purposes).

2. Agricultural systems: Land tenure problems,
- 3a. Development of agriculture and the roles of science technology.
- 3b. Government policies as they affect local agriculture.
4. Climate as a determinant of local agricultural products.
5. Use of agricultural and forest products and their by-products.
6. Soil formation and properties.
7. Soil and water conservation:
  - (a) Depletion of soil resources by leaching, cropping, and oxidation of organic matter.
  - (b) Erosion - its importance and causes, prevention and control.
  - (c) Irrigation and drainage.

#### Practical

- (a) Recognition of common rock types, e. g., igneous, metamorphic and sedimentary.
- (b) Recognition of soil samples - soil profiles.
- (c) Recognition of types of fertilizers and manures.
- (d) Examination of soil samples for texture by feel only and for acidity by colorimetric tests.

Scheme of Work in Agricultural Science - Year IV

1. Soil fertility:
  - (a) Plant nutrients.
  - (b) Major sources of nitrogen, phosphorus and potassium.
2. Maintenance of soil fertility.
3. Plant parts - their functions, growth, development and reproduction (with emphasis on their agricultural implications).
4. Annual and perennial plants.
5. Pastures and forage crops:
  - (a) Recognition and study of main grasses and legumes species commonly used in pastures. (Detailed botanical studies are not required.)
  - (b) Natural pastures and their distribution.
  - (c) Important forage grasses and legumes and their uses. (Study at least one legume and at most four grass species.)
6. (a) Crop improvement aims:
  - (b) Introductions, selection and cross-breeding as means of crop improvement. (Chromosomes and Mendel's laws are not required, samples of a local variety and improved variety of a crop plant can be shown.

7. (a) Recognition of common annual and perennial local weeds.
- (b) Importance of weeds in agriculture.
- (c) Methods of dispersal and control of weeds.
8. (a) A simple general account of plant diseases, (fungus, bacterial and virus) affecting crops.
9. (a) Types and importance of pests of crop plants and stores products (rodents, birds and insects).
- (b) Principles and methods of pest control. (An account should be given of the life cycle of biting insects, e. g., grasshopper, a borer, e. g., weevil, a sucker, e. g., an aphid.)
10. Farm animals: purposes of their production.

#### Practical

- (a) Recognition of main pests and their damage in crops, e. g., stem borers of cereals, cotton stainer, weevils of grains, nematodes of root crops, and yam beetles.
- (b) Recognition of main diseases of crops with characteristic symptoms, e. g., smut in cereals, maize-rust, swollen shoot of cocoa, mosaic of cassava, rosette and leaf-spot of groundnut, blast of rice, and brown-rot of pineapple.
- (c) Recognition of some parasitic weeds such as dodder.

- (d) Recognition of the structure of seeds and fruits of weeds in relation to the mode of dispersal.
- (e) Recognition of these insecticides and fungicides and their uses: DDT, Perenox, agroicide, bordeaux mixture, Gammaline ZO, etc.

### Scheme of Work in Agricultural Science - Year V

1. Principles of animal nutrition:
  - (a) Nutritional requirements of animals: carbohydrates, fats, proteins, minerals and vitamins.
  - (b) Feed stuffs - sources of main nutrients.
  - (c) Rations: balanced, maintenance and production rations.
2. Reproduction in farm animals.
  - (a) Mammary glands; milk lactation; egg formation; weaning of young.
3. Study of one of the following: Cattle, horses, sheep, goats, pigs, rabbits and poultry, including main aspects of general management, feeding and breeding.
4. Animal improvements:
  - (a) Local breed and an improved one could be compared for demonstration purposes.
5. Diseases: A general account of locally important diseases

of farm animals. The preventive and control measures available.

6. Pests and parasites: insects and ticks as carriers of diseases in farm animals.

### Practical

Recognition and comments on the use of main animal feed-stuffs, e. g., palm kernel meal, blood meal, bone meal, maize, guinea corn, groundnut cake, fish meal, and common forage crops, e. g., guinea grass, elephant grass, giant star grass, andropogon, calopogonium, pueraria, centrosoema and stilosanthis.

Recognition of main ectoparasites and endoparasites of animals, e. g., ticks, lice, tapeworms and round worms.

### Agricultural Education Advisory Committee

"The whole people must take upon themselves the education of the whole people" -- John Adams (1952) (13, p. 2).

There is a growing realization that public schools are public.

They belong to the public, The public pays their cost. Laymen have had a large part in its development. Herbert M. Hamlin was reiterating the above when he said "In the United States, both agriculture and education have long been invested with public interest" (13, p. 2).

Therefore it will be a breach of trust, if the school fails to meet the

need of the community. To know the need of the community the community must be involved. One of the most effective ways in which the agricultural education teacher can do this is through the establishment of an agricultural education advisory committee. An agricultural education advisory committee has been ably defined as, "A committee of citizens organized for the purpose of serving in an advisory capacity, to the vocational agricultural program of a school system" --The Oregon Board of Education. In his own view, Keith Fiscus of the Washington State University enunciated that,

A program of agricultural education should be planned and developed by all the persons affected by it. The agricultural teacher is certainly a central figure, but the plan should not be developed only by the teacher. The school administration, other vocational and academic teachers, advisory councils, and key persons in the community should also be utilized (8, p. 6).

Kenney E. Gray, Assistant Professor of Agricultural Education, Ohio State University, once stated

One of the toughest jobs facing local teachers is that of conducting accurate and rational planning for the development of a local vocational educational program. This job is difficult because it involves obtaining and using information from multiple agencies and sources as a basis for establishing needs, and providing education for a wide range of present and emerging occupations for entry level employment. And also for further education. All this must be accomplished with limited resources (8, p. 9).

A competent well representative agricultural education advisory committee will be of tremendous help in alleviating the above problem.

Hamlin (1950) in his book, "Citizens Committee in the Public Schools," said "One of the most serious problems in many rural communities has been the retention in these communities of enough capable young men to make it possible for the communities to make advances" (12, p. 33). An effective agricultural education advisory committee seems to be the logical answer. The committee could be an asset to the teacher in planning a sound agricultural program which will exploit all the world of work within the community and acquaint the students with it.

All the foregoing represent the view of eminent authorities in agricultural education, whose opinions should be respected. Their consensus is that the agricultural education advisory committee is an indispensable element to the success of an agricultural education program.

Agricultural Education Programs -  
U. S. and Nigeria

Agricultural education in schools in the U. S. came into being upon persistent demand by the people. In 1785, a movement for the promotion of agriculture was formed. A few years later in 1792, mainly in response to the agitation of these associations, colleges undertook to provide for instruction in agriculture, first Columbia and then Harvard and Yale (7, p. 7). Since then, the interest of



the American public in agricultural education grew by leaps and bounds. The Nixon law of New York in 1897 which provided for the extension of agricultural education into public schools, under the direction of the agricultural college of Cornell University, was concomitant on public enthusiasm. This was followed by the Davis Bill of 1910 urging the introduction of agricultural education in elementary and secondary schools. It also made the provision of one cent of each state per capita to schools giving instruction in agricultural education (7, p. 25).

Thus gradually but surely, agricultural education grew in importance in the United States' schools. All the elements necessary for the promotion of agricultural education in schools were brought into play. Only certified graduate teachers are allowed to handle the subjects in schools. Agricultural education teachers are required to make a survey of the school districts, so that their programs reflect the need of the school community. Agricultural education advisory committee was introduced to serve as a liason between the school and the community. Agricultural education program continues to expand to reflect the gradual evolution of the society. First it was limited to farming, then expanded to include vocations in farming. Agri-business and agricultural education for leadership are some of the new additions. However, despite this rapid expansion in the agricultural education program, the

programs are usually tailored to serve the school's immediate communities first. The agricultural education programs for Cascade High School and Lebanon High School provided earlier in this study attest to this statement.

Agricultural Education Program  
in Kwara State, Nigeria

God give me the moral quality to learn not to criticize  
my neighbor until I have walked a mile in his  
moccasins -- Indian prayers.

A quick glance through the agricultural education programs for Kwara State high schools will convince one that the authors deserve praise for doing such a magnificent work. This is more so, if one considers how difficult it is to prepare an agricultural program for a whole state, let alone one which embraces a whole country. One cannot help agreeing in part with the agricultural science teacher for Ilorin secondary school when he extolled the adequacy and the relevance of the program. But if he were to have undergone the type of training which the author has undergone, he might have noticed some glaring defects which will be exposed later in this study. Similarly the agricultural education teacher for Omu Aran Secondary School upheld the adequacy and the relevance of the present program. But he thought that it was too much for the time allotted to it. He went further to criticize the small amount of

money allocated to agricultural science departments; he, however, failed to mention what specific areas he would have improved should the adequate funds be made available. The Chief Local Education Officer Ilorin local authority, who was an agricultural science teacher himself, would want to see more of practical work in the first two years of agriculture in our secondary schools. One should not fail to see this as a pertinent suggestion. However, a careful scrutiny of the agricultural education program will reveal it as lacking grossly in some vital aspects.

In the first place the program is supposed to serve the entire community. But at best it seems to be preparing students for college, thereby limiting its service to the upper and possibly the middle classes. The important factor of incorporating the agri-businesses of Kwara State into the program, which at least will help the children of the low class to benefit from their training is either neglected or not realized. A list of the agribusinesses of Kwara State provided elsewhere in this study is an eloquent testimony to this fact. This pitfall alone in our agricultural education program may make it a Herculean task for agricultural science teachers to motivate their students.

Also, right from the introduction of the subject into our schools, at no time has the community been involved in planning. How then does the authority expect the public to have confidence and interest

in a program to which they are not exposed? Little wonder then that parents often speak out that they have not sent their children to school to farm. The inclusion of the agricultural education advisory committee representative of the various vocations in the community will reveal to parents that the subject means much more than farming.

There also appears to be some duplications in the present program. In year I week 4, forests of Nigeria are to be taught. In year III week 5 the use of forest products is to be taught. These two could be conveniently merged together without any additional time. Similarly the topics on soil in year I week 5 and that in year III week 6 could be handled as a single entity. A close look at the program contents for years I and IV reveals that the topic is a mere repetition of year IV. The topics on weeds in years IV and V can also be conveniently merged. Practical work relating to livestock keeping and practical farm management need to be stretched a bit more.

It is surprising that at nowhere in the whole program was field trip mentioned. There is also nothing like the FFA for leadership training.

The new program to be presented may reveal a little bit more.

### In-Service Training Programs

In-service programs are a form of post service training programs organized for employees in various establishments to bring their professional efficiency up to date. The origin of in-service training programs the world over has disappeared into the limbo of history. Like any institution, the programs have their demerits; nevertheless, their efficacy in improving teachers' conditions of service and their professional proficiency cannot be questioned.

Ralph W. Tyler (1972) once remarked,

In the period ahead we will see the introduction of new technological devices, the extension of the classroom to the resources of the community-at-large, and the emergence of new instructional materials and methods. Each of these will demand special teaching skills. We must capitalize upon the lead time remaining, identify these skills as soon as possible, and institute programs of professional growth which guarantee skill mastery (31, p. 16).

Louis J. Rubin (1972) in his own comment said, "A teacher who lacks knowledge of his subject matter, or who hasn't mastered the required pedagogical skills or the art of interacting with his students, can be helped by a careful retraining intervention (31, p. 19-20).

Philip W. Jackson remarked (1972),

Any discussion of a topic as broad and as amorphous as what to do with or for practising teachers ought to begin with a confession of ignorance. In-service training is

one of many ways to make teaching better. Nonetheless, all that we can assume is that in-service as a strategy for improving education is of sufficient merit to warrant further thought (31, p. 19).

As the reform of educational practices continues, heuristic learning, individualization of instruction and teacher specialization will increase. We must develop efficient programs that equip teachers to deal with these modifications in instruction - Robert N. Bush, 1972 (31, p. 69).

In the writer's opinion, therefore, the unanimity of opinion which was positively expressed in favor of in-service training programs for teachers justifies its institution and continuation.

#### In-Service Training Program for Teachers in the United States and Kwara State

The first striking difference between the in-service training program for teachers in the United States of America and Nigeria, is the time factor. Whilst a period of 120 to 130 years could serve as a bench mark for the establishment of in-service program in the former; its introduction in the latter was comparatively quite recent. A form of informal in-service teachers' training appeared to be going on in Fort Wayne, Indiana in 1857 (31, p. 5). At that time, teachers who could hardly boast of high school education were being advised by influential laymen in the community on how to maintain crude discipline in the classrooms. As time went on, however, particularly after the first World War and until the Great Depression

of 1930's, a quantitative standard was established for teachers. All teachers were required to have at least a bachelor's degree. Since by the time, less than half of the teachers had a bachelor's degree, a tremendous investment in in-service training program had to be made (31, p. 10). The success of the in-service programs could be judged against the background that today, it is difficult if not altogether impossible to find a grade school teacher in the United States of America without a bachelor's degree.

Although the routes of the attainment of the goals seem to differ in the two locations, the goals appear to be the same. These are:

1. To improve the service conditions of the teachers,
2. To increase their professional competence.

The type of in-service training programs for teachers in Kwara State are similar to those given to teachers in the U.S. to satisfy either the basic renewal or the award of Standard Teachers Certification requirements. However, there are minor modifications:

1. All the teachers for the in-service, mostly have their bachelor's degrees plus some teaching proficiency requirements, before they go in for the in-service program in the U.S. Possession of a bachelor's degree is not a prerequisite for participation in in-service program in Kwara State of Nigeria.

2. Credits earned from an accredited college during in-service program may count toward a master's degree diploma award in U.S. In Kwara State, all that such in-service training could achieve for a teacher is increased professional competence and possibly moves him horizontally across the payroll.

From these, it could easily be perceived that whilst training programs are designed which could improve a teacher's professional proficiency and also upgrade him simultaneously in the U.S., in Kwara State it is the former that is usually satisfied.

However, in Nigeria generally as in Kwara State, there are some in-service programs either overseas or within Nigeria, mostly offered via leave with or without pay. Under such a program a teacher could have the best of both worlds.



### III. PROPOSED AGRICULTURAL EDUCATION PROGRAMS

Make no little plans. They have no power to stir men's souls, and probably they never will be realized --  
Martin Burnham, 1950 (12, p. 409).

From the time when the writer entered the teaching profession in January 1957, he served in various capacities relating to the profession. He started as an elementary school teacher, a primary school teacher, a school manager (of a school not then recognized by the government), an agricultural science instructor in teachers training institutions, and finally as assistant inspector of education. In each of these capacities, the writer was involved in agricultural education in one form or another. Consequently, the author was able to have a fair appraisal of the agricultural education program in the state. He was then able to conclude that in order for an agricultural education program to serve the community effectively and to stimulate students' interest sufficiently, it must not only include vocational agriculture, but also emphasize it. This is more so in rapidly evolving communities as in Kwara State of Nigeria.

Baker (1965) seems to support the above observation when he states,

It is a recognized fact that the job opportunities for people in agricultural education and in some cases with simply a farm background, continue to increase. A vast number of these jobs in agricultural businesses and in allied

industries do not need to be filled with persons with baccalaureate degrees (2, p. 104-105).

The Vocational Education Act of 1963 in the United States amended the previous vocational education acts to permit vocational agricultural education to include educational programs involving the knowledge and skills needed by persons engaged in off-farm agricultural occupations. Adjusting the old and designing new curricula in vocational agricultural education is inevitable, if the program is to be effective and is to deal efficiently with the dual functions of providing vocational education for both on and off-farm agricultural occupations (6, p. 6).

In the light of the preceding discussions, the following have been considered in evolving the new program:

1. The food crops for the state.
2. The main cash crops for the country.
3. Suitable livestock for the State's high schools.
4. Elementary agricultural mechanics.
5. A survey of the present and the prospective agribusinesses in Kwara State of Nigeria.
6. The forest resources of the State.
7. Providing students with opportunities to enter higher agricultural institutions.
8. The Young Farmers Club as an integral part of

agricultural education program.

9. Other essential ingredients of a sound agricultural education program are:

- a. Advisory Committees.
  - b. In-service education for agricultural science teachers.
1. The food crops in the State are as follows:
    - a. Yams
    - b. Guinea Corn (sorghum)
    - c. Cassava (Manihot Esuelenta)
    - d. Maize (corn)
    - e. Bean
    - f. Rice
    - g. Potato (Ipomea batata)
  2. The main cash crops for the country are:
    - a. Cocoa
    - b. Groundnuts (peanuts)
    - c. Cotton
    - d. Sheanuts
    - e. Coffee
    - f. Palm tree products
    - g. Rubber
  3. The suitable livestock for the State high schools are:
    - a. Pigs

- b. Poultry
  - c. Sheep and goats
  - d. Rabbits
  - e. Guinea pigs
4. Elementary agricultural education mechanics will involve the theories and the application of the following simple machines:
- a. Levers
  - b. Pulleys
  - c. Wheels and axles
  - d. Management of farm implements, wheelbarrows, trucks, plows, etc.

Based on the information obtained from Kwara State Official Diary, following are tabulations of the agri-businesses and the allied industries (Table 2).

#### Instruction Areas

To satisfy the new additions to and the adjustment of the old program a number of instruction areas are considered. This is based on the Oregon Curriculum Guide for Agriculture, but with certain modifications (24, p. 16).

However, in selecting the instruction areas suitable for Kwara State High Schools, the writer is governed by three factors:

Table 2. Agricultural industries in Kwara State, Nigeria.

Type	Possible industry	1969-70 quantity and location	Remarks
1. Cocoa	Cocoa processing	About 2, 200 tons produced mainly in Kabba, Oyun and Igbomina/Ekiti Divisions.	The production is over double that of 1968/69. The increase is due largely to the greater effort put into the control of pests and diseases.
2. Robusta Coffee	Coffee processing	About 1, 440 tons sold. Produced mainly in Kabba and Kogi Divisions.	The sale figure does not represent total production; a large quantity filtered into neighboring states and production was lower than that of the previous year. The fall is likely due to the irregularities of the rains.
3. Oil palm and palm kernel	Production of palm oil for local markets. Oil processing industry.	Large quantities are produced in Ankpa, Idah, Dekina and Kabba Divisions. About 32, 000 tons palm kernel sold.	Three pioneer oil mills are processing wild oil palms. Commercial oil palm plantation possible at Idah.
4. Cotton	Textile Industry	About 300 tons sold. Produced mainly in Borgu, Ankpa, Dekina and Idah Divisions.	Production is being extended to suitable areas in other Divisions.
5. Soya-beans	Soya-bean milk, oil extraction	This is produced mainly in Igbirra and Kogi Divisions.	Special efforts are being made to expand its production.

Table 2. Continued.

Type	Possible industry	1969-70 quantity and location	Remarks
6. Benniseed	Benniseed crushing industry	About 172 tons sold. Produced mainly in Igbirra and Kogi Divisions.	The crop is being introduced to some other Divisions with a view to boosting the production.
7. Citrus	Citrus juice canning, squash manufacture	Over 26,000 seedlings were distributed to farmers during the year. The main citrus producing area is Kabba Division.	Citrus production is increasing rapidly. The establishment of a citrus processing industry will help remove the glut prevalent at harvest time.
8. Sugar-	Sugar manufacture, alcohol distillery	Produced mainly at Bacita Sugar Estate in Lafiagi/Pategi Division. The plantation is about 10,000 acres.	The plain between Lafiagi and River Niger is most suitable for another sugar cane plantation.
9. Rice	Rice milling, polishing and packing	The production during the year is estimated at over 250,000 tons. The main producing areas are Lafiagi/Pategi, Kogi, Dekina and Idah Divisions.	Efforts are being made to expand the production of this crop. There is a great potentiality for its production along the Niger valley.
10. Yam	Yam processing flour industry	Over 800,000 tons were produced. It is produced in every Division in the State but mostly in the southern part of the State.	There is a good market for yam flour.

Table 2. Continued.

Type	Possible industry	1969-70 quantity and location	Remarks
11. Cassava	Cassava starch industry.	Over 700,000 tons were produced. The crop is produced in every Division in the State.	The establishment of a cassava industry will lead to rapid increase in production.
12. Guinea corn	Processing for consumption	Over 100,000 tons are produced annually. It is grown in every Division in the State but mainly in the northern part of the State.	New high yielding varieties are being introduced.
13. Maize	Manufacture of corn flakes, corn oil and livestock feed.	Over 250,000 tons are produced annually. The main producing area is the southern part of the State.	The production will shoot up rapidly when a maize processing industry is established.
14. Vegetable	Vegetable canning especially tomatoes	A large quantity of onion is produced in Borgu and Ilorin, Lafiagi/Pategi Divisions.	There are good markets for vegetables around big towns in the State. There is great potentiality for their production along river valleys.
15. Tobacco	Cigarette manufacture	This is grown mainly in Borgu, Ilorin and Igbomina/Ekiti Divisions.	Philip Morris (Nigeria) Ltd. is actively encouraging the expansion of the production.
16. Sheanut	Sheanut oil and cake	About 93 tons sold.	The production will shoot up if the market price rises substantially.

Table 2. Continued.

Type	Possible industry	1969-70 quantity and location	Remarks
17. Groundnut	Oil mill industry	About 80 tons produced The main producing area is Borgu Division.	The production of the crop is expanding rapidly.



Table 3. Forest resources in Kwara State, Nigeria.

1. Gmelina	A total of 1,007.60 acres on plantations.	Paper, match sticks, fibers dissolving pulp and eventual production of cellulose fibers.
2. Iroko timber	Large quantity, not yet estimated.	Building and furniture manufacturing.
3. Mahogany timber	Large quantity, not yet estimated.	Building and furniture manufacturing.
4. Opepe timber	Large quantity, not yet estimated.	Building and furniture manufacturing.
5. Terminalia Ivorensis	Large quantity, not yet estimated.	Building and furniture manufacturing.
6. Terminalia superba (white wood)	Large quantity, not yet estimated.	Building and furniture manufacturing.
7. Obeche	Large quantity, not yet estimated.	Matches and papers.
8. Antiaris	Large quantity, not yet estimated.	Matches and papers.

N. B. There are 5,761.17 square miles of Forest Reserves in the State in which species 2-8 (column one above) are found.

1. Time allotted to agricultural science in the school curriculum.

Agricultural science takes six periods a week. Each period lasts forty minutes, although there is usually an additional one and a half hours in the evening once a week which is assigned to club activities. Young Farmers Club is usually run during this time, so that a lot of agricultural science activities, particularly as regards leadership can be pelleted into the period.

2. The school financial allocation.

3. The developmental stage of the State.

Compared with any state in the United States, agricultural education in Kwara, particularly in high schools, is still in its embryonic stage. Practical agricultural mechanics can only be limited to the construction of simple livestock housing. Agricultural business management is to be limited to record keeping and other various but pertinent operations which contribute towards maximizing production efficiency. Leadership and personal development may be best dealt with primarily during the Young Farmers Club activities, although from time to time ten minutes can be set aside for discussing Young Farmers Club activities. This may be at the beginning or towards the end of a lesson.

With regard to occupation, it may not be expedient at this stage to give it a separate heading. Rather, each instruction area

should be tactfully exploited to take care of its related occupations. From the foregoings, it may be justified if the instruction areas are limited to:

1. Animal Science
2. Plant Science
3. Soil Science
4. Agricultural Mechanics
5. Agricultural Business
6. Leadership and Personal Development.

#### General Objectives

The general objectives of the selected instruction areas are:

1. To assist students in the selection of an agricultural occupation.
2. To develop agricultural competencies needed by individuals engaged in, or preparing to engage in production agriculture.
3. To develop agricultural competencies needed by individuals engaged in, or preparing to engage in off-farm agricultural occupations.
4. To develop an educational and experiential basis for entry level into employment in agriculture.
5. To develop an educational and experiential basis for post high school training and for specialization in agriculture.

6. To develop skills needed to exercise and follow effective leadership in fulfilling occupational, social and civic responsibilities (25, p. 9).

In fulfilling objective number 6, reliance has to be almost entirely placed on the Young Farmers Club since it is the only institutional agricultural club, which parallels the FFA in the United States. Furthermore, the author is compelled to suggest the abdication of the responsibility to the organization, due to limited staffing, which will make it almost impossible to include it as part of the classroom instruction.

### A Five Year Program Analysis

#### Year I

1. Farm and Garden Tools
  - a. Origin
  - b. Types and Maintenance
2. Identification of Local Flowers and Hedges.
3. A Typical Plant - Parts and Functions.
4. Food Crops of Kwara State.
  - a. Classification into annuals and perennials.
  - b. Classification into legumes and non legumes.
  - c. Their dietary importance.

5. Local Weeds.
  - a. Identification by common names only.
6. Crop Pests and Identification by Common Names.
  - a. Insects.
  - b. Rodents,
7. Farm Animals and their Economic Values.<sup>1/</sup>

### Practical

1. Examination of some simple anatomical parts of a plant using the hand lens.
  - a. Stomata and root hairs.
  - b. Stamens and pistils.
  - c. Drawing the examined features.
2. Care of the school ornamental plants.
3. Young Farmers Club activities.
4. The keeping of guinea pigs.

### Year II

1. Agriculture.
  - a. Meaning, development and economic importance.

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<sup>1/</sup> In dealing with both crops and animals, frequent references will be made to their ecological distribution.

- b. Roles of the agricultural products in Nigeria's economy (frequent reference to Kwara State).
2. Farming Systems.
    - a. Shifting cultivation.
    - b. Crop rotation.
    - c. Mono and mixed croppings versus mixed farming.
    - d. Pastoral farming.
  3. Garden Management.
    - a. Choice of site.
    - b. Layout and vegetable beds' construction.
    - c. Care of the vegetable crops.
  4. Fertilizers.
    - a. Farm yard manure.
    - b. Compost.
    - c. Green manures.
    - d. Artificial fertilizers with emphasis on NPK and their sources.
  5. Cash Crops of Kwara.
    - a. Sugar cane.
    - b. Tobacco
    - c. Cocoa.
  6. Farm Records
    - a. Livestock records

- b. Crop records.
  - c. Cash account records.
7. The agri-industries of the state.

Practical

- 1. Garden management.
- 2. Recognition of fertilizers.
- 3. Y. F. C. activities.

Year III

- 1. Technology and Agriculture - Machines only.
  - a. The principles of simple machines.
    - i. Levers.
    - ii. Pulleys.
    - iii. Friction, causes and reduction.
- 2.
  - a. Wheelbarrows.
  - b. Tractors.
  - c. Trucks.

Emphasis on their contribution to production efficiency.
- 3. Government Policies and Agriculture.
  - a. Land tenure systems.
  - b. Agricultural education.
  - c. Research and extension.

4. a. Credit facilities and subsidies.  
b. Quarantine and vaccinations,  
c. Farm settlements.
5. Soils.
  - a. Rock types.
  - b. Rock weathering and factors affecting soil formation.
  - c. Composition and properties of soils.
  - d. Soil water, origin, movement and importance.
6. Soil water and conservation.
  - a. Depletion of soil resources by leaching and oxidation of organic matters.
  - b. Erosion - causes, importance and control.
  - c. Irrigation and drainage.
7. a. Forest and wildlife for conservation purposes,  
b. The importance of liming.

#### Practical

1. Recognition of common rock types - igneous, metamorphic and sedimentary rocks.
2. Recognition of soil samples.
3. Identification of fertilizers - organic and inorganic.
4. Soil acidity by colorimetric tests.
5. Y.F.C. activities.
6. Management of the school farm.



Year IV

1. Living population of the soil: earthworm and termites.
  - a. Carbon cycle.
  - b. Nitrogen cycle (Nitrogen fixing bacteria).
  - c. Cultural practices which promote crop production.
  - d. Trace elements and their significance.
2. Food Crops of Kwara State - Annuals and Perennials.
  - a. Study the external morphology, life history, propagation, growth, cultivation, harvesting, storage and marketing.
    - i. Yams and cassava.
    - ii. Guinea corn and maize (sorghum and corn).
    - iii. Cowpeas (beans) and groundnuts (peanuts).
3. Forest products of Kwara State.
  - a. Palm oil and products.
  - b. Sheanut tree and products.
  - c. Timber.
  - d. Agri-industries associated with each of the above.
4. Orchard management,<sup>2/</sup>
  - a. Citrus fruit.
  - b. Mangoes

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<sup>2/</sup> Propagation, cultivation included.

5. Pastures and forage crops.
  - a. Recognition and study of main grasses and legumes commonly used in pastures.
  - b. Preservation as hay and silage including principles.
6. Agriculture and technology.
  - a. Crop improvement and aims.
  - b. Selection and crop breeding as a means of improvement. (Samples of a local variety and an improved variety can be shown.)
7.
  - a. Economic importance of weeds in agriculture.
  - b. Methods of dispersal.
  - c. Physical control.
  - d. Biological control.
8. A simple general account of plant diseases.
  - a. Bacteria and fungus diseases.
  - b. Methods of transmission, nature of damage and control methods.
9. Principles and methods of pest control. (The life history of a biting and a sucking insect should be studied.)  
Grasshoppers, weevils and aphids.
10. Marketing systems.
  - a. Direct.

- b. Contract.
  - c. Auction.
11. Discussion on agri-occupations of the states.

Practical

1. Recognition of main pests and their damages to agricultural crops.
  - a. Stem borers in cereals.
  - b. Cotton stainers.
  - c. Weevils in grains.
  - d. Yam beetles in tuberous and root crops.
2. Recognition of main diseases of crops.
  - a. Smut in cereals.
  - b. Leaf rust in maize (corn).
  - c. Swollen shoot of cocoa.
  - d. Leaf spot in peanut.
3. Recognition of some parasitic weeds.
  - a. Dodder.
  - b. Mistletoe.
  - c. Recognition of weed fruits with emphasis on structures of importance to seed dispersal.
4. Recognition of some insecticides: DDT, Gamalins, Agrocides.
5. Rabbit Management.

6. Young Farmers Club Activities.

Year V

1. Principles of animal nutrition.
  - a. Nutritional requirements of animals: carbohydrates, fats, proteins, minerals and vitamins.
  - b. Feedstuffs - sources of main nutrients.
  - c. Balanced rations - maintenance and production.
2. Reproduction in farm animals.
  - a. A general outline of development.
    - i. Nourishment, respiration and the birth of the young.
    - ii. Egg formation in poultry.
  - b. Heat period - estrous cycle (simple - no detail).
  - c. Mammary glands, milk lactation.
  - d. Egg formation.
  - e. Weaning of the young.
3. Study two of the following to illustrate the above:
  - a. Rabbit and poultry.
  - b. Pig and poultry.
  - c. Sheep and poultry.

4. Animal Improvement.<sup>3/</sup>
  - a. Aims.
  - b. Selection and cross breeding.
  - c. Insemination as a means of animal improvement.
5. Diseases.
  - a. A general account of local poultry and any one of the animals selected for study from the above.
  - b. Preventive and control measures.
6. Parasitic Pests.
  - a. Life history of an endoparasite of farm animals, e. g., life fluke, round worm of pigs, tape worms.
  - b. Ectoparasite and life history, only one of the following: ticks or lice.
  - c. The principles and methods of control of pests and parasites of farm animals.

#### Practical

1. Recognition of grass feeds, e. g., Johnson grass, Sudan grass, guinea grass, elephant grass, etc.
2. Recognition of the main ecto and endo parasites.
3. Keeping of poultry or pigs.
4. Construction of poultry houses.

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<sup>3/</sup> Compare local pigs and the improved ones. Also compare local poultry and improved ones.

5. Operation of an incubator for hatching or needle teeth clipping and castration where pigs are kept.
6. Young Farmers Club activities.

### Advisory Committee

An agricultural education advisory committee has been rightly defined as a committee of citizens organized for the purpose of serving in an advisory capacity to the vocational agricultural program of a school system -- Oregon Board of Education.

Advisory councils and committees have been in sporadic use in agricultural education in the United States for at least thirty-five years. The public school is the public's, and a good part of public education depends on keeping people believing that this is actually the case. The advisory committee is one device for saying to the public, "This is your school and your agricultural department. We want to use it for the attainment of values which you think are important" (13, p. 111).

Even as early as 1923 the British policy on education recognized the importance of an advisory committee. So it set up an Advisory Committee on Native Education in the British Tropical African dependencies (22, p. 42).

Since the agricultural education program is set up to serve the Kwara State community foremost, an Agricultural Education

committee is not a luxury but a necessity.

As in most endeavors in life, if a clear purpose is stated or a goal is in mind, that activity is generally accomplished. For as Paul Meyers (1973) says, "Definite plans produce definite results. Indefinite plans do not produce indefinite results, they typically produce no results at all." And so it is with advisory committees. Their functions are determined by the needs of the program as seen by the instructor (24, p. 11).

However, the following can serve as a guideline for the purpose and functions of the Agricultural Education Advisory Committee in Kwara State.

1. The people of the community should be involved in determining what should be offered.
2. The committee should criticize constructively the instructions offered and the available instructional facilities.
3. Evaluate once a year at least, the objectives, the course offerings, personnel and the instructional facilities of each of the sections of the agricultural education programs.
4. Supply technical information when needed.
5. Lend validity to proposals for new and expanded programs.
6. Increase teachers' confidence in moves toward program improvement,
7. Assist with activities of youth organizations.

8. Review and revise agricultural education program budget and recommend to the Ministry of Education through the school administration.

The Composition of Agricultural Education Advisory  
Committee in Kwara State, Nigeria

The success or the failure of an advisory committee depends almost entirely on its composition and the backing given to it by the state government. Since the institution of an advisory committee is going to be a new innovation in agricultural education program in Nigeria, the author has drawn exhaustively on the current practice in the United States. However, in the light of educational development in Kwara State, the writer thought it expedient to modify what currently obtains in the United States, to fit into Nigeria's environment.

1. Since a greater percentage of the population, particularly in the rural areas is illiterate, and the wherewithal of financing education is the state government, it may not be out of place if the agricultural teacher in consultation with the Divisional Inspector of Education and his principal, nominates in his own opinion suitable people to the committee. This should be subject to the Ministry of Education's approval.

2. Members so nominated should be as representative of the



community as much as possible, but at the same time include personnel from the various agri-business establishments in the community.

3. The inclusion of the Chief Local Education Officer, the Assistant Inspector of Education and at least one person from the Ministry of Agriculture serving in the area. The first two are in most cases experienced but non-graduate ex-agricultural education teachers. Three local farmers and at least one representative of the Young Farmers Club should be included to serve the community's and the students' interest respectively.

4. The above composition insures that an experienced old hand is always on the committee. For one thing, the Chief Local Education Officer always stays put in the division.

5. The appointment of the chairman may be better done by the ministry, but it will serve a useful purpose if the agricultural education teacher is the secretary.

6. Meetings should be held as often as it is necessary, but preferably thrice a year. Since in most schools in Nigeria, there is usually one or at most two agricultural education teachers, the different subject matter advisory committees may not be feasible at this stage.

The potential value of an advisory committee rests in its membership. They should be recognized and respected specialists

in their fields. Their understanding of the needs of individuals and the community affords the education, assistance in developing and maintaining realistic programs (24, p. ii).

In a nutshell, the role of the advisory committee is quite challenging, and it is hoped that the people who may be called upon to constitute it in Kwara State will be more than equal to the task. For the efficacy of this new innovation in agricultural education program will bring more life to the subject in the state.

#### In-Service Training

"Whatever is worth doing at all is worth doing well."

In-service training programs are usually an administrative strategy designed to expose the post-service employees to current development in their fields, so that they may be continuously adequately equipped for their jobs. However, whilst the purpose of in-service training seems to be identical in both the United States and Nigeria, it has different connotations in the two countries.

In the United States it denotes short courses organized for teachers, particularly during summer vacations to help them improve their professional competence. It does not include going to a college to run a full degree program. In Nigeria it embraces all post service training programs including short courses during vacations, both undergraduate and graduate training programs.

In-service training programs of short duration, lasting not more than six weeks in most cases are termed refresher courses. Those training programs involving undergraduate or graduate work but which last up to or more than one academic session are either designated in-service training with or without pay. For the purpose of this study, the writer wishes to use refresher courses for all the training programs of less than three months' duration, and advanced training programs for any in-service training lasting up to or more than one academic year; whether they lead to undergraduate or graduate work.

A brief diagnosis of the problems confronting the teaching of agricultural science in Kwara State high schools will help to vindicate the writer on his proposed in-service training programs for its teachers.

The West African Examination Council allows a high school to enter its students for a subject at the school certificate level, provided that the subject is being handled in the school by a graduate teacher. Thus when the Kwara State government introduced compulsory agricultural education in all its high schools sometime in 1971, it became incumbent on the Ministry of Education to recruit professional agriculture graduates, although these recruits did not appear to have any teaching qualification. This was the best that the government could do in the circumstance, since there is no

college in Nigeria which offers a degree in agricultural education. The NCE non-graduate agricultural science teachers who teach the subject were very young when introduced into the teaching profession. They have acquired a treasure of experience through years of service. Invariably, most of them are adept teachers. The writer therefore considers that it will be in the best interest of all, if this group of teachers is provided with opportunities to go in for a degree course via in-service training programs. Ways and means of accomplishing this are suggested in the proposed program.

### The Proposed Program

#### The Refresher Courses

For easy understanding, this is categorized into two:

1. In-state Refresher Course. It is suggested in this study that the Kwara State Ministry of Education appoint an inspector of education to co-ordinate all agricultural science education activities in the state. His duties among others ought to include:

- A. Inspection of the teaching of agricultural science in the state's high schools, with the sole aim of advising teachers and finding out what areas of the subject are delinquent.
- B. Organize in-state refresher courses for teachers. In doing this, it may be wise of him to pinpoint the major

areas of deficiency which he might have observed during his inspection duties. The contents of the refresher course should reflect these observed weaknesses. Individual teachers who were observed capable in those areas whether NCE or graduate teachers should be employed during the training program to impart their talents to their less gifted colleagues.

- C. It may also be expedient if circulars are sent out three months ahead of time to the agricultural education teachers to sound their opinions on what areas they would like the on-coming refresher course to cover. Their opinions ought to be respected in planning the contents of the program. This has not been the procedure.
- D. As was implied above, the course should reflect the teachers' need, but it is suggested here that the course should be used as a forum for acquainting the teachers with newly established agricultural occupations in the state.
- E. The whole course is suggested to last a week.

## 2. Out of State In-Service Course.

### Out of State Refresher Courses

Ahmadu Bello University at Zaria, which is jointly owned by the six northern states, usually conducts a three-week refresher

course for teachers, under the auspices of the Institute of Education. From the writer's own personal experience, courses offered here often bore little or no relevance to the needs of the agricultural science teachers. It is therefore suggested here that the Kwara State Ministry of Education through its Agricultural Science Subject Inspector:

- A. Initiate suggestions to the Institute of Education as to the needs of its agricultural science teachers; thus rendering the courses meaningful to them.
- B. Agricultural science teachers who have become outstandingly diligent consequent to the application of the knowledge from the courses should be written a letter of commendation either with or without any form of token present by the ministry. This is contrary to the present practice.
- C. Those who attend the Zaria refresher courses should each be given a certificate of attendance.
- D. Those agricultural science teachers, particularly of the NCE staff, who have attended both the in and out of state refresher courses, should be given opportunity to proceed for advanced courses. This does not seem to be reflected in the current programs.

## Advanced In-Service Programs

1. Degree Course. What degree of emphasis should be placed on the necessity for teachers to have at least baccalaureate as an entry requirement for teaching, particularly in high schools, has been a bone of contention among educationists for some time. Mosher (1966) writing on the report of Allahabad Agricultural Institute in India, stated that after a period of in-service training for both the graduate and the non-graduate extension workers, there was no difference in the level of performance of the two groups (21, p. 138).

Alvin Kenneth Pfahl in his doctoral dissertation reported that, although administrator and supervisors favored degrees as important in teacher preparation, in the measurement of students' learning in specific behavioral objectives, no evidence was found that indicated the superiority in performance of one over the other (29, p. 27).

George Storm (1966) in his doctoral dissertation stated that the directors of technical education programs who conducted a survey in forty-four states of the Commonwealth of Puerto Rico, concluded that success in teaching was positively correlated with advanced degrees (32, p. 74). By inference from this, one could

hypothesize that a degree course is a necessary preparation for entry into teaching profession.

However, whatever is the merit or the demerit of having a degree as a prerequisite for entry into teaching profession, the writer strongly suggests the provision of opportunities for the present NCE agricultural education teachers to go in for a degree course for the following main reasons:

1. The Kwara State Government in its honest attempt to raise the standard of education is emphasizing degree qualification for its secondary school teachers. Unless the NCE agricultural science teachers possess a degree, their professional status and performance will continue to be limited in scope.
2. Lack of adequate graduate agricultural science teachers to handle agricultural science in the existing secondary schools in the state will hamper the effort of the government to improve and expand agricultural education. This may have its attendant disastrous consequences.
3. From the writer's personal experience, the high school students for some reasons, seemed to have more confidence in, and are apparently more responsive to the graduate teachers than their NCE counterparts. This



relationship could engender a feeling of inferiority complex in the latter and impair their efficiency.

In the present program the chance of an NCE agricultural education teacher going for a degree course, is a possibility no bigger than a knat's eye.

To achieve degree education for the NCE agricultural education teachers in Kwara State, the following suggestions are offered:

1. The Kwara State government should press for the establishment of the department of agricultural education at Ahmadu Bello University. If there are no sufficiently qualified Nigerian personnels to man the department, recruitments should be suggested from the United States.
2. Prior to the implementation of 1 above, NCE agricultural education teachers may be sent to the university to major in agriculture and minor in education or vice-versa.
3. Another suggestion is that the state government seek special assistance from the federal government to award scholarships to its NCE agricultural education teachers to study overseas. The United States of America could be the proper venue.
4. Much of the foreign scholarship awards for the state could also be used to benefit the NCE agricultural science teachers.

5. The Kwara State government itself could scheme out a form of scholarship awards tenable in overseas countries to the teachers.
6. This degree program may be with or without pay, but preferably the latter.

B. Commonwealth Bursary. NCE agricultural education teachers should be considered for this award, with the specific motive of undertaking courses of study relevant to their field. This, though it does not usually lead to a degree award, it will help to boost the morale of the teachers and improve their level of performance.

The proposed in-service training program will surely involve a lot of money. But the government may have to choose between two evils. Either to fall a victim of Rubin's (1972) statement which is modified to read,

As the agricultural education program expands, cost will escalate, naira will become scanty and the government in a false economy, may under-estimate the importance of sound in-service programs. In so doing, it will continue, if not extend the tolerance of flawed performances in executing what is otherwise a sound agricultural education program (31, p. 209).

Or be a party to Meade's (1972) admonition which reads thus,

We should recognize the importance of teacher in-service training and accord it high priority. In the long run we shall realize that money and energy devoted in support of a self evolving teacher may prove to be the most sensible expenditure we can make (31, p. 210).

The writer has no doubt that the Kwara State government will choose the latter.

A careful scrutiny of the proposed program will reveal the inclusion of ways and means of how the government in part will meet its financial commitments.

#### IV. SUMMARY, RECOMMENDATIONS AND CONCLUSION

There is no tonic like doing the right thing boldly and finding that it succeeds. -- Walter Lippman (13, p. 409).

##### Summary

The teaching of agricultural science in Nigerian schools is almost as old as the introduction of the western education itself into the country in the early part of the nineteenth century. The provision made in the 1946 ten-year development plan for the country, even by the colonial administrators, for the establishment of Rural Education Centres for the training of agricultural science teachers, attested to the importance attached to the subject.

Both prior to and after independence and up till now, Nigerian leaders have been echoing their conviction of the need to emphasize agricultural science in schools, if the nation is to tap her enormous agricultural resources fully. Various state governments have been enthusiastic about promoting agricultural science in the schools within their states. In this regard, Kwara State government deserves to be congratulated for being one of, if not the first, government in the six northern states to introduce compulsory agricultural education in all its secondary schools.

Yet, from the writer's personal observation, all the efforts

made so far have failed to catch fire. The current program, though with a lot of merits, appears to have neither stimulated students' interest sufficiently, nor motivated parents enough to give remarkable support to the agricultural education program.

In this study, effort has been made to alleviate the above problems. Young Farmer Clubs have been made an integral part of agricultural education with the hope that its activities will publicize the entire program to the community. Agricultural Education Advisory Committees have been introduced to serve as a bridge between the school and the community, thereby helping to turn the eyes of the parents to the meaningful intention of the government. The program not only acquaints the students with the world of work in agriculture, but also prepares them to enter into any of the agribusinesses in their community. This is to provide for students who may not proceed to colleges or any other higher institution for further formal education in the subject. Practical work involving livestock and crop management has been emphasized to serve the need of those who may be involved in production agriculture. Elementary agricultural mechanics to teach the principles of machines and to expose the students to the practical use and the maintenance of simple machines was included. This was a deliberate calculation, aimed at developing awareness in students of the economic advantages of employing simple modern agricultural implements in farming. The

study also concerns itself with the plight of those students who may want to proceed to colleges and other higher institutions, to increase their knowledge and competence in agriculture. Thus it has attempted to cover all the disciplinary areas in agriculture. Whatever is the case, the agricultural science teacher is the manager and the ultimate executioner of the agricultural science program. This study recognizes this when it advocates an ambitious in-service education program, including the provision of opportunities for the NCE agricultural science teachers to go in for a degree course. The purpose is to help the teacher improve both his personal and professional needs, so that he may come to look on his job with a smile on his face.

In the present study, the present agricultural education program in the country has been analysed and has been compared with what obtains in the United States, which the writer considers to be the most advanced agricultural and industrial country in the world, in order to produce an effective program for the state. Suggestions were also made on how the state government could cope with the anticipated financial problems involved.

To summarize the summary, this study has taken into consideration the interests of all those who will be involved in agricultural education program. If they all cooperate, this study may be a vehicle for helping individuals concerned to help themselves, and

develop citizens who are concerned about the public welfare and who are able and are willing to contribute to it. This is the gist of what the study is designed to accomplish.

### Recommendations

Nigeria is ranked among the developing nations of the world. Like most of her colleagues in that category, she is trying tooth and nail to establish her economic independence. A nation cannot be self dependent economically unless she is prepared to exploit her natural resources to the full. Fortunately, Nigeria, an agricultural country, is doing this by encouraging agriculture in all its facets. The prominence given to the agricultural education in the school curriculum supports the above contention. But for the agricultural education program to succeed in any community, it must receive the full support of those who are to be directly or indirectly concerned with the program. In the light of this, the following recommendations are suggested for the effectiveness of an agricultural education program in Kwara State high schools:

1. Since agricultural education is a dynamic subject, changing and broadening rapidly, teachers should always be equipped to meet anticipated changes, through in-service training programs, seminars and further graduate work.
2. The government should labor the training of the NCE

agricultural science teachers to the point of honor, by giving them opportunities to go in for a degree course in anticipation of introducing the teaching of the subject beyond the school certificate level,

3. Because of the significance of agriculture to the survival of the state, the Kwara State Ministry of Education should appoint a special education inspector whose job will be the supervision of the teaching of the subject, and also the planning of in-service education programs for the teachers.

4. Agricultural education teachers should be allowed to submit yearly estimates to the Ministry of Education through their principals. The establishment of a special financial allocation to the agricultural science departments in schools is also overdue.

5. The agricultural science teacher should be allowed, with the permission of his principal, to spend part of the money realized from the sale of the school agricultural products to improve his department.

6. The Young Farmers Clubs' activities should be publicized by encouraging the clubs to participate in agricultural shows. They should also take part in inter-schools' speech contest and agricultural products shows (livestock and crops).

7. The special inspector appointed to take charge of the subject in the state should be conversant with the establishing agribusinesses in the state. He should in turn keep all the agricultural



science teachers in the state informed accordingly.

8. An agricultural education advisory committee should be established in each school community and be given the ministry's backing.

9. In executing the agricultural education program, the ministry should give encouragement to teachers to utilize pertinent resource persons and organizations. Field trips should also be encouraged.

10. To promote agricultural education programs, teachers should always consider the need of the school community.

11. All the aims of the lessons in agricultural education should be behaviorally stated.

12. The government should make provisions for a desirable trend toward the offering of more courses in agriculture at the high school level, to meet the ever-increasing diverse needs of the students.

### Conclusion

Although the exigency of my having to undertake this study outside my country served to militate against my effort, nevertheless, I have been able to draw on a number of resources which are too numerous to mention. Personal experience and the background knowledge of where the study is supposed to operate helped in no

small measure. Books and pamphlets were consulted, personal contacts were made with people, and my study in the United States proved to be of immense help.

However, because of the possession of diverse conceptions of education in individuals, I do not expect this study to receive unanimous acceptance by all the people concerned. I am convinced whatever is the case that it will be given a fair trial. "A tree is known by its fruit"; it is my fervent hope that the fruit that will be realized consequent to the execution of this study will be convincing. This I hope is the end of a long journey.

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APPENDICES

## APPENDIX I

Recommended Local Vegetables

	<u>Common Names</u>	<u>Botanical Names</u>
1.	Okra	Hibiscus esculentus
2.	Eggplant	Solanum melongena
3.	Sweet pepper	Capiscum annum
4.	Hot pepper	Capiscum frutescens
5.	Carrot	Daucaus carota
6.	Tomato	
7.	Onion	
8.	Radish	Raphanus sativus
9.	Turnip	Brassica rapal
10.	Sweet potato	Ipomea batatas
11.	Irish potato	Solanum tuberosum
12.	Water melon	Citrullus vulgaris
13.	Pumpkin	
14.	Beans (Dwarf, French)	Phaseolus species
15.	Amaranthus	
16.	Celosia species	Celosia argentea
17.	Indian spinch	
18.	Talinum	
19.	Isapa*	Hibiscus sabdarifa
20.	Ekú*	Sesamum orientale
21.	Beets	Beta vulgaris
22.	Cauliflower	Brassica oleraces
23.	Sweet corn	Zea mays
24.	Cucumber	Cucumis sativus

Source of Vegetable Seeds

1.     Suttons and Sons, Reading, England.
2.     Hurst and Sons Ltd., Kelvedon House, 60104 Artillery Lane, London E. E. England.
3.     Reuter Seed Co., New Orleans, U. S. A.
4.     Plateau Development Co., Bukuru Road, Jos, Nigeria.
5.     Kingsway Stores, Ibadan, Kano, Kaduna - Nigeria.

Equivalents of Measures

1 Matchboxful of sulphate of ammonia	= 1-1/4 oz.
1 Matchboxful of sulphate of potash	= 1-1/2 oz.
1 Matchboxful of superphosphate	= 1-1/4 oz.
1 Matchboxful of perenox	= 1-3/4 oz.
1 Matchboxful of captan	= 1/2 oz.
1 Matchboxful of Insecticides dusts (e. g., Dieldrin 2%, Malathion 4%, Agrocice 3)	= 1 oz.



Common Weeds in Nigeria

	<u>Common Name</u>	<u>Scientific Name</u>	<u>Growth Habit</u>
1.	Wuta-wuta (local name)	<i>Striga senegalensis</i>	Annual
2.	Sandbur	<i>Cenchrus brownii</i>	Annual
3.	Finger grass	<i>Chloris polydactyla</i>	Annual
4.	Bermuda/Bahama grass	<i>Cynodon dactylon</i>	Perennial
5.	Crowfoot grass	<i>Dactyloctenium aegyptium</i>	Annual
6.	Large crabgrass	<i>Digitaria sanguinalis</i>	Annual
7.	Little barnyard/ short millet	<i>Echinochloa colonum</i>	Annual
8.	Goose grass/yard grass	<i>Eleusine indica</i>	Annual
9.	Congon grass	<i>Imperata cylindrica</i>	Perennial
10.	Guinea grass	<i>Panicum maximum</i>	Perennial
11.	Swordgrass/razorgrass	<i>Paspalum virgatum</i>	Perennial
12.	Yellow foxtail	<i>Setaria geniculata</i>	Annual
13.	Johnsongrass	<i>Sorghum halepense</i>	Perennial
14.	Redroot pigweed	<i>Amaranthus retroflexus</i>	Annual
15.	Garden spurge	<i>Euphorbia hirta</i>	Annual
16.	PWD weed, tridax	<i>Tridax procumbens</i>	Annual
17.	Spiny amaranth	<i>Amaranthus spinosus</i>	Annual
18.	Dodder	<i>Cuscuta species</i>	P. Perennial
19.	Lion's ear	<i>Leonotis nepetaefolia</i>	Annual
20.	Florida beggarweed	<i>Desmodium turtuosum</i>	Annual
21.	Common purslane	<i>Portulaca oleracea</i>	Annual
22.	Pink purslane	<i>Talinum triangulare</i>	Annual

## APPENDIX II

Agricultural Science Syllabus for the Nigeria Certificate in Education  
Advanced Teachers' College, Zaria

A Three-Year Course

The course is intended to provide students with sufficient knowledge and practical skill to eventually take the responsibility of Agricultural Science in a Teacher Training College or Secondary School.

Individual and group experiments in the laboratory and garden will be encouraged in the belief that the subject is essentially a science, requiring the discipline and method that this implies.

General farm practice will be demonstrated by small-scale experiments and plots - 1/10 acre - individually hand-farmed by the students. Visits will be arranged from time to time to the Agricultural Research Station, Samaru, N. T. C. Demonstration farm, nearby Ministry of Agriculture projects, School of Agriculture, Samaru, and N. A. Forestry.

The College Estate makes adequate provisions for a wide range of horticultural and agricultural work and on the livestock side bees, rabbits, guinea pigs and poultry are kept. To increase the variety of livestock still further, it is hoped that pigs will be added soon.

The Agricultural Department shares a laboratory with the Chemistry Department. This arrangement is not without its attendant problems as students have no opportunity to do a private laboratory work outside classroom hours.

Students taking Agricultural Science also offer Biology as a major subject and Chemistry as a minor.

First Year  
Soil Science

<u>Soil and its improvement</u>	<u>Periods</u>
1. Soil: Origin, formation, composition and characteristics of chief types. Rocks and rock formation and types. Identification of different kinds of rocks.	20
2. Air, water, and temperature in different soils.	15
3. Soil improvement drainage and irrigation, part played by Ministry of Agriculture in establishing drainage and irrigation schemes; cultivation, rotation, manuring, liming, soil erosion and control.	15
4. Soil texture and structure, types and improvement.	10
5. Clay minerals, soil collids, flocculation and deflocculation, suspensions and solutions.	15
6. Chemistry of soil, soil sampling, mechanical analysis of soil. Ammonification and nitrification of soil. Calcium carbonate content of soil. Exchangeable buses of soil. Testing for ions in soils, plants extract and fertilizers.	30
7. Soil organic matter - physical and chemical properties.	5
8. Plant nutrition. Major and minor elements - deficiency symptoms. The use of fertilizers, lime and farm yard manure. Identification of fertilizers.	30
9. Soil organisms - activities of influence on soil productivity. Nitrogen-fixing bacteria, nitrogen cycle, carbon cycle.	20
10. Soil classifications according to climate, soil profile, soil series. Tropical soils. Nigerian soils. Characteristics of the relationship of soil and plant growth.	10

<u>Soil and its improvement (cont.)</u>	<u>Periods</u>
11. <u>Climate</u> : Weather recording - temperature, relative humidity, direction of wind, clouds. Formation of dew, fog, frost, clouds, rain, snow. Factors affecting climate, latitude, altitude, nearness to the sea, prevailing winds with particular reference to Nigeria. The importance of climate on crops, and livestock distribution in Nigeria.	10
Total periods	180

### Horticulture

<u>Garden Practice</u>	<u>Periods</u>
<u>Cultivation</u> : types and effects, use and care of garden tools	10
<u>Plant Propagation</u> : seeds - raising seeds in the nursery sowing, pricking out, thinning, transplanting; the chief vegetative methods of raising crops in the vegetable garden; choice of site.	16
<u>Vegetable Growing</u> : rotation, planning and planting a vegetable garden, intercropping catch crops. Garden weeds - their life-cycles; methods of control and eradication; vegetable pests and diseases, prevention and methods of control.	16
<u>Flower</u> : Flower growing, annuals, biennials, perennials; the herbaceous border, bulbs. Flowering trees and shrubs - methods of propagation, cultivation, pruning, lawns: grasses, establishment of and maintenance.	20
<u>Fruit Growing</u> : Selection, propagation, cultivation, pruning and spraying: citrus trees, guava, banana, mango, dates.	
<u>Weeds</u> : definition, effects, types, economic importance, general methods of prevention and control with particular studies of important weeds of farm and garden; poisonous plants.	10

<u>Horticulture (Cont.)</u>	<u>Periods</u>
<u>Herbicides:</u> Manure-type, the indoor compost making.	10
<u>Practicals:</u> Vegetable gardening - Each student will have 6 vegetable beds of 4' x 12'	2 terms
<u>Farm:</u> For practical purposes, a student will farm a plot of 1/10 acre. He will be expected to keep during this period, relevant crop record books and diaries.	2 terms

2nd Year  
Animal Science

	<u>Periods</u>
<u>Housing:</u> general principles, materials foundations, drainage, siting, simple construction methods, suitable designs for the housing of school live- stock.	6
<u>Nutrition:</u> constituents of diet, bulk, balances; digestion absorption, assimilation in (a) ruminants, (b) non- ruminants, (c) birds; Farm foods, concentrates, succulents, and roughage, animal feeding in prac- tice; maintenance and production rations, starch and protein equivalents; Total digestible nutrients, nutritive ration, compounding rations for livestock, making up a ration.	40
<u>Reproduction and Breeding:</u> reproductive system of the rabbit and fowl (if this part has not been covered by the Biology Department).	
Important breeds of livestock common in Nigeria, conformation, type, grading up selection of breed- ing stock, practical applications of genetic princi- ples; hybrid vigour, sex linkage, line breeding; arti- ficial insemination, embryology of the chick (as seen with the aid of hand lenses/stereoscopic (micro- scopes); gestation and parturition; life-cycles.	20
<u>Rearing and Production of</u>	
(a) <u>Rabbits:</u> feeding and management for meat and fur; breeds.	6

<u>Rearing and Production of (cont.)</u>	<u>Periods</u>
(b) <u>Poultry</u> : incubation, natural and artificial, brooding, rearing pullets to point of lay, broiler production - debeaking, fattening cockerels, caponisation, egg production, free range, folds deep litter, hen yards and batteries. Poultry health, nutrition, etc.	30
(c) <u>Pig Husbandry</u> : <u>Pig Production</u> . Breeds, breeding, farrowing management, oestrus cycle, and fertility, artificial insemination, growth farrowing management, castration, housing, equipment, methods of management, nutrition, digestion, fattening, weaning, records, health.	
<u>Agricultural Chemistry</u> : Structure of organic compounds, isomerism; methods of writing formulae and equations, terminology, paraffins, olefines, acetylenes, cyclo-paraffins. Benzene and related compounds; multi-ring hydrocompounds, heterocyclic compounds. Alcohols and phenols; ethers. Aldehydes and ketones, carboxylic acids, Amides, compounds containing amino, the imino, and nitrogen unit, amines.	94
<u>Outline Chemistry of</u> : Lipides; carbohydrates; proteins; animal and plant pigments. Enzymes; vitamins; hormones; insecticides; fungicides; herbicides.  Agricultural Chemistry (Practical)	50
<u>Crop Botany and Production</u> : Some export and subsistence crops in Nigeria - cereals, fibre crops, legumes, oil crops, fruits and vegetable crops.	60
<u>Pests and Diseases of Crop Plants</u> : virus, bacteria, fungi, parasitic plants; General methods of prevention and control: rotations, hygiene, resistant strains and varieties; use of chemicals; destruction of intermediate hosts; legislative measures; transporting and marketing of agricultural products.	12
<u>Beekeeping</u> : Biology of the honeybee, life history, and social habits. Hives and essential equipment. Management of honey production including feeding. Swarm control methods handling, queen raising and stock increase.	12

Third Year

	<u>Periods</u>
Cattle; breeds, calf rearing, natural and artificial; milk production; fattening for beef in yards and on grass; anatomy of the digestive system.	40
(This part of the work will be done in close association with the Veterinary Department and the Institute for Agricultural Research, Samaru)	10
Chemistry of Milk.	
<u>Sheep</u> : Distribution, uses, typical breeds, breeds, breeding, feeding.	4
<u>Goats</u> : Management, breeding, rearing, feeding.	4
<u>Pests and Diseases of Animals</u> : Animals - Casual agents, parasitism, viruses, bacteria, platyhelminthes, insects, arachnida, nutritional deficiencies and disturbances. General methods of prevention and control. Economic importance of pests and diseases.	12
<u>Grasses</u> : Botany of economic value, identification of common indigenous grasses, some grass and legume species of Nigeria, seed mixture, seed production, establishment of the Sward in Nigeria; Management and manuring and improvement grassland utilization (This section should be related to the nutrition of cattle and ruminants in general).	18

Forestry in Nigeria

Broad classification of forest types in Nigeria. The influence of forest on climate and soils. Important forest products.

- a) Large and small timbers
- b) Timber and poles for local requirements
  - e.g., building, pulpwood, firewood, and wood for charcoal burning, gums, resins and essential oils; local crafts.

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The study of four trees of local importance and four foreign trees - recognition of specimens, utilization and cultivation.

Forest reserves - economic values; management. Visits to local authority's forest reserves and nurseries.

Talks on Forestry in Nigeria by forest experts.



Agricultural Economic

Periods

General Introduction of Agricultural Economics

- Input: Production (a) Land; Problems - Land tenure, use government policy, inheritance.
- 12
- (b) Labour; types amount in farm/garden, motivation; relationship with employees.

Capital: Investments: tools and machineries, buildings, manure fertilizers, land improvements, irrigation, control of erosion, fencing, gate.

Entrepreneur - management, organization, sociological factors/problems involved.

Agricultural Improvement. How?

Problems: Problems arising from local farming systems, nomadic cattle grazing systems and local systems of land tenure.

Marketing Boards, Co-op Societies, Credit Societies, Community Development, Land uses/Farmers Clubs and Societies, Labour, Y. F. C.

10

Subsistence crops and cash crops, fadama crops, The introduction of improved crops and stock.

Records and Recording:

Accounts:

Problems of mechanization of agriculture in Nigeria 6  
Ref: (Samaru Newsletter of Prof. Darling)  
 Sociology and Agriculture in Nigeria.

The Development of Nigerian Agriculture.

Shifting cultivation, nomadic system, terrace agriculture, permanent agriculture based on manuring and rudimentary crop rotation, rudimentary mixed farming; irrigation, erosion as constitute soil 10

The Development of Nigerian Agriculture (cont.)Periods

fertility problem; problems of mechanization and technical engineering; land ventures; activities of F. A. O. extension specialist, V. S. A. O. and Agricultural Research Stations.

(To be related with Agricultural Economics)

The activities of the Agricultural Research Station in the development of Nigerian Agriculture. 10

The influence of climate and soil on Nigerian agriculture; manures (organic) and chemical fertilizers.

Agricultural Science in School.

Aims, syllabus; Young Farmers Club, laboratory organization; special projects.

Preparation of: syllabus, scheme of work, lesson note. Use of improvised materials for teaching Agricultural Science. 30

Experimental Work: Design, simple statistical methods of reporting experiments.

Individual Study

Each student will select a suitable topic from either soil, horticulture, agriculture or animal husbandry for more detailed personal study and will present a dissertation on it. It must include evidence of practical work and results of experiments, and these must be related to two aspects of investigation, one being concerned with husbandry and the other with scientific principles and laboratory work.

Examination

Successful students will be required to satisfy the examiners under each of the following headings:

- (i) Written examination - Parts 1, 2, 3, and 4.
- (ii) Practical examination (laboratory and garden/farm)
- (iii) General course work:
  - (a) essays
  - (b) practical work in the garden/farm and with livestock.
  - (c) individual study.
  - (d) continuous assessment grades accumulated by a student throughout his course.