



**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**COURSE CODE : AGE 421**

**COURSE TITLE :  
TEACHING VOCATIONAL AGRICULTURE,  
IN SCHOOLS**

**NATIONAL OPEN UNIVERSITY OF NIGERIA  
SCHOOL OF SCIENCE AND TECHNOLOGY 14/16  
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**AGE 421:  
TEACHING VOCATIONAL AGRICULTURE,  
IN SCHOOLS**

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**Age 421: Teaching Vocational Agriculture in Schools**

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### **1.0 Introduction**

Vocational agriculture has deep roots in the farming systems within the pre-colonial era. At that time, able-bodied youths engaged in gardening and apprenticeship system where the master - tradesman gave out instructions informally. The mediaeval period improved agricultural practices through the modification of some traditional tools. The modern phase which is a technological one uplifted the entire practices to a mechanized system which apparently require saleable skills and knowledge.

This unit packaged all the historical ingredients of vocational agriculture from the pre-colonial to the post-colonial era. The teaching of vocational agriculture is at higher levels in the University, Polytechnics, Monotecnics and Colleges of Education. At the National Open University programme, it is a fourth year course taken at the first semester and it is a two (2)

credit units to be offered by all students undertaking Bachelor of Science B.Sc (Ed) Agricultural Education.

## **2.0 Objectives:**

By the end of this unit, you should be able to trace the history of agricultural education in Nigeria and its impact in the education sector.

## **3.0 Main Body:**

### **3.1 Meaning of Vocational Agriculture:**

Vocational agriculture involves actual involvement in farming activities while agricultural education is the acquisition of skills and knowledge in agricultural science with the view to imparting these knowledge and skills into prospective farmers for better productivity.

According to Okorie, (2001), Vocational agricultural education encompasses farming and agro-allied business organizations including others involved services and sales in agriculture. This definition buttresses the meaning of vocational agriculture which says that vocational agriculture involves actual involvement in farming, while agricultural education is the acquisition of skills and knowledge and the dissemination of there skills/knowledge to the recipients.

According to Phipps (1963), the purpose of vocational education in agriculture is to educate present and prospective farmers for proficiency in farming. He opines that such education provides systematic instruction in agriculture of less than college grade in the public schools for those persons who have entered upon, or who are preparing to enter upon, the work of the farm or the farm home.

### **3.2 History of Agricultural Education:**

Early efforts in agricultural education and vocational technical education deserve mention. In 1887, the education ordinance provided for increased

government grants-in-aid for agricultural and industrial technical education activities. Bonny Boys High School, Hope Wadel Training Institute in 1900 and Nasarawa School in 1909 benefited from vocational technical subjects introduced, e.g. carpentry woodwork, typing, tailoring and painting. After some years, other institutions such as Railway, Ports Authority, NEPA, Mining Companies and Agriculture were in need of skilled men to handle their various operations.

In Nigeria, it is not specifically known what the earliest form of teaching of agriculture was. This is because what is today known as Nigeria is a collection of independent groups who had very little cultural miscegenation among themselves. However, literature shows that the teaching of agriculture in the country pre-dates the introduction of formal education by European Missionaries. Fafunwa (1974) reported that the teaching of practical agriculture was an important aspect of the African traditional education system before colonial intervention. He explained that agriculture was taught through the attachment of a learner to understudy a master-farmer. Okeke (1984) described this teaching approach as both functional and practical, leading to social responsibility, skill acquisition, self-reliance, sound work ethics, spiritual and moral values. Olaitan (1985) on his part described this form of teaching as strict training through observation and imitation of a traditionally competent farmer. He noted that in this system serious attention was paid to teaching students all they needed to know about the chosen occupation and instilling in them the spirit of discipline and perseverance. For this reason Fafunwa (1967) worried about the short-

existence of this approach even though he admitted that teaching was not done in an organized manner as obtainable in formal schooling.

The nature and scope of the teaching of agriculture in Nigeria took a different turn with the introduction of Western education in the country in 1842. From this period the teaching of agriculture classroom and in the field, when Nigeria got her independence in 1960, it was realized that the existing agricultural education system did not augur well for her agricultural and economic development. Specifically, it was observed that instead of producing highly motivated and highly skilled farmers, the system produced graduates who loved white collar jobs and lacked essential farming skills.

### **3.3 Agricultural Education in the Nigerian Educational System:**

Realizing the pivotal role of agriculture in the national economic development and the need to produce competent agriculturists, planners of the new educational system (the 6-3-3-4) made far-reaching recommendations. First, the teaching of agriculture was formally introduced into the primary school curriculum. Secondly, changes were made at the secondary school level of their educational system which include introduction of pre-vocational agriculture in junior secondary schools and emphasis on skill acquisition.

When education policy was reviewed to the 6-3-3-4 system of education in the late 80's, a great deal of prominence was given to the study of agricultural education at the junior and senior levels of secondary curriculum. Though, the objectives of studying agricultural science in post

primary schools which among others include exposing students to occupations and opportunities in the fielding of agriculture seemed defeated because majority of students openly reject the subject agricultural science with the erroneous belief that it is meant for their ground fathers in the country side. This apathy towards agriculture as a profession by the younger generation may continue with advent of high technology where emphasis is being shifted to computer education as the only noble profession.

In 1959, the Federal Government set up Ashby Commission. The commission recommended the establishment of more Universities to offer courses in agriculture, engineering and other courses. This commission made an important landmark in the development of agricultural education in higher institutions in the country. These institutions are to train students for teaching and leadership positions in farmer education. The aforementioned depicts that government had done a lot towards establishment of Universities and Colleges of Education that offer agricultural education. However, government has no incentives for motivating students and teachers of agricultural education. The result and effect of lack of incentives and political will to encouraging agricultural education on the part of government had led to a situation where most students prefer other areas such as medicine, law, engineering etc. The Technical Teachers' Training Programme (TTP) used by government was to encourage the teachers and students to study agricultural education. Nonetheless, what government is yet to do as regards agricultural education supercedes what she had done towards the general awareness of the course (agricultural education) is low among



Nigerians, yet agricultural education possesses the transient value of uplifting the agricultural sector of this nation through better farm machinery utilization, better dissemination of research information to rural farmers and teach same to subsistence and commercial farmers.

### **3.4 The Impact of 6-3-3-4 Curriculum on Agricultural Education:**

The 6-3-3-4 system of education has had a long history. The Federal, State and Local Government in Nigeria are currently executing the system. Historically, the 6-3-3-4 system of education developed from the junior and senior high school system about 1890 in the United States of America. Having phased out the 8-4 primary and secondary education system in United States in 1890 led to the adoption of 6 years of primary education, 3 years of junior high school, 3 years of the senior high school education and 4 years of a first degree in the liberal arts (Ukeje, 1983). Some educationist and philosophers see the school as the only one of the many social agencies which the society employs to prepare the young for effective roles in a country like Nigeria. It is obvious that Nigeria is overtly optimistic about the role the school, especially the 6-3-3-4 educational system would play towards making Nigeria a technologically advanced country. The question is how has the curriculum of 6-3-3-4 system of education impacted on agriculture which holds the key to self sufficiency in food production? According to Okorie (2001), agriculture became an important school subject after the graduation of the first N.C.E. students in agricultural science in the early 60s. Agriculture was made a core subject in both the junior and senior secondary school curriculum. The board objectives of agricultural education at the secondary school level include the following:

- To stimulate and sustain students interest in agriculture.

- To enable students acquire basic knowledge and practical skills in agriculture.
- To enable students integrate knowledge with skills in agriculture.
- To prepare students for further studies in agriculture.
- To prepare and expose students to occupations and opportunities in the field of agriculture.

To achieve the aforementioned objectives, the curriculum content of the senior secondary school level consist of major concepts in agriculture such as production, protection and economics. Allied topics to these concepts are divided into six units, namely crop production, animal production, agricultural ecology and systems, agricultural engineering, agricultural economics and extension. It should be noted that there is continuity from (JSS) to (SSS) programmes in a way that concepts introduced at the JSS are broadly treated at the SSS level to produce articulated development of concepts to foster learning and comprehension by students.

In the 6-3-3-4 system, agricultural curriculum is patterned to embrace learning by-doing. This would enable students to produce food and other agricultural products for themselves and the communities within which they found themselves. A major impact of the 6-3-3-4 system on agricultural education can be viewed in the light of the competencies bestowed on recipients of agricultural education. Since agricultural education curriculum emphasized competency curriculum, it follows that in the competency curriculum, the subject matter of a course is divided up into competencies considered in vocational agriculture essential and which must be acquired by students before they graduate (Okoro, 1993).

Competency curriculum depicts that each student works at his own rate before moving to a higher competency task when a lower competency task has been accomplished without hitches. In using or applying competency in agricultural education, clearly stated competencies for every aspect of occupational area in agriculture are identified.

#### **4.0 Conclusion:**

Vocational agriculture equips recipients with desirable skills and knowledge in order to excel in the production phase of agriculture vocational agriculture is a hybrid of pre-colonial agricultural practices. Before the advent of western education, the peasant farmers used crude and rudimentary implements that could only produce crops for their livelihood and sustenance. Due to civilization, the technological advancement metamorphosized agricultural practices from the rudimentary practices to the advanced and improved system. The contribution of agricultural education to National Economy is so enormous and this led to its integration into the curriculum under the 6-3-3-4 education programme of Nigeria.

#### **5.0 Summary:**

In this unit you have learnt that;

- Agriculture and agricultural education started with human existence on the planet earth.
- The practice geometrically improved from the rudimentary style to technological advanced style.
- The relevance of agricultural education has practically integrated its practice in the 6-3-3-4 education system of Nigeria.

#### **6.0 Tutor-Marked Assignment:**

1. Trace the history of agricultural education in Nigeria.

2. What is the relevance of agricultural education in the Nation's economy?
3. Explain the concept of 6-3-3-4 agricultural curriculum
4. What is the impact of 6-3-3-4 curriculum on agricultural education?

#### **7.0 Reference/Further Reading:**

Fafunwa, B.A. (1967). *New perspective in African Education*, Lagos: MacMillian and Company

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Okorie, J.U. (2001). *Vocational Industrial Education*. League of researchers in Nigeria. Bauchi.

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Olaiton, S.O. (1985). *Competency-based Professional Improvement Needs of Agricultural Science Teachers in Secondary Schools*. The Ondo-State Experience. CON Monograph Series one.

Okoro, O.M. (1993). *Principles and methods in Vocational and Technical Education*. Onitsha. Varsity Industrial Press.

Phipps, L.J. (1963). *Hand Book on Agricultural Education in Public Schools*. Danville, Illiois. The Insterstate Printers and Publishers, Inl.

Ukeje, B.O. (1983). *The Roles of Colleges of Education in the 6-3-3-4 system of Education*. Paper presented at the Nigerian Educational Research Association. University of Benin.

## **Unit 2: Preparing Teaching Plans:**

### **Contents:**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Body
  - 3.1 Teaching Unit
  - 3.2 Teaching Sequence
  - 3.3 Modules of Instruction in Crop Production
  - 3.4 Modules of Instruction in Animal Production
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 Reference/Further Readings

### **1.0 Introduction:**

A teacher just like a builder embarks on careful and articulate plan of activities before commencing effective teaching. This step is pertinent and compulsory for all teachers, however, some experience ones rarely plan their daily activities. They always assume to be well-versed in knowledge and experience. This type of teacher offer mislead students with false information. Therefore, it is advisable for all teachers to be ready with teaching unit for that period.

### **2.0 Objectives:**

By the end of this unit, students should be able to:

- Define the term lesson plan
- Practically plan a 45 minutes lesson
- Structure modules for crop and animal production.

### **3.0 Main Body:**

#### **3.1 Teaching Unit:**

A teaching unit maybe defined as the projected plans for the carrying out of those learning activities and the provision of student activities which lead to the realization of the activities of a course of instruction (Uga, 1985). He opines that in unit planning, the whole course is divided into small workable sections which include related topics. By bringing related topics together, a unit facilitates comprehensive and increases student interest, unified picture of the objectives which should be achieved through a particular unit and the methods and techniques to be used. In general, the contents of a unit are closely related and have a singleness of purpose. Teaching units usually take four, five or six weeks to teach. According to Uga (1985), units of two weeks duration or less would not be considered significant or comprehensive. He enunciated that the distinguishing quality of a teaching unit is its central concern with a field of its significant experience for the student. Such unit should not stand alone. They should not be isolated from other units in a course, nor from relevant concerns. Ideally, a unit of study may be the organization of activity from which flow learning experiences in all phases of school work.

Some essential features of a unit plan include:

- Entering behaviour
- Objectives
- Content
- Methods and activities
- Material needed
- Evaluation

### 3.2 Teaching Sequence:

One of the most important qualities of a plan is an indication of the sequence of teaching activities, ie the time relationship of the development of ideas (Uga, 1985). Uga posits that it is not enough to state the objectives outline the content and list the procedures and materials. The interrelationships of these should be anticipated. Since the teaching goes formed on a time basis, the plan should indicate what is to be done first, and the sequence of the development of the unit. It is not desirable to specify the amount of time that should be spent n each phase of the unit. Such guessing is at best misleading and may lead to inflexibility. From a practical point of view, it seams preferable to determine an approximate total time for a unit and to anticipate within this time the sequence of procedures and event with only a very approximate estimate of the time to be spent on each.

A schematic representation of the steps in unit planning is as shown below:

Name of Unit

Student Characteristics  
Entry Behaviour

Unit Objectives

Unit Content

Teaching/Learning  
Activities and Materials

## Evaluation

**Source:** Uga (1985) P.269

### **3.3 Modules of Instruction in Crop Production:**

A module is a segment of an instructional programme which serves as a basis for day-to-day planning. It is from the module that the teacher derives daily lesson plan. The word daily should be emphasized because, if a study of a particular module in a course is to last six weeks, a course which meets five days per week would require thirty lesson plans. To begin to organize his plans, the teacher looks at the content, knowledge, skills and effective outcome as a whole and the time at his disposal for presenting that content to the students. The next step is to break that content into its principal topics. The teacher should estimate the amount of time necessary for most and hopefully all the students to master the materials. After identifying the topics and the time available for each topic, the teacher proceeds to create a type of plan which earlier times was called a unit but is now commonly referred to as a modules.

While a modular plan in the social studies, for example, would be quite different from a modular plan in skill areas such as farming, typing gymnastic, teachers in all areas need to spell out goals, objectives, pre-assessment techniques, instructional procedures and evaluation.



Following the structural chart flow of modular design, the two programme areas (crop and animal) which are practically-oriented will be included in the modules. In this design, the time allocated to each item in a module is not a rigid guide, rather it will guide the teacher to work within the allotted time for practicals on the time table. Other items embodied in the module include: specific objectives to be achieved at the end of each module, description and division of contents.

Module of instruction in crop production programme.

Title: Husbandry of selected crops.

Description: Students will develop skills needed to grow cereals, pulses, roots and tubers, vegetables and fruits, beverages and species, oil late ad fibres.

S/No.	Divisions or Units of Contents	Time Allocated (Minute)	
		Class	School Farm
1	Method of propagation	9	18
2	Climatic and Soil requirements	5	10
3	Land preparation, planting date seed rate, spacing, sowing depth and nursery requirement	13	30
4	Manuring and fertilizer requirements and application	9	18
5	Harvesting, processing and storage of the selected crops	9	14
Total		45	90
Grand Total		135mins	2hrs, 75mins

Source: Agbulu and Ekele, (2004)

### 3.4 Module of Instruction in Animal Production Programmes:

**Title:** Anatomy and physiology

**Description:** Students should be able to identify parts and some important organs of farm animals, state the function of some of the organs, of farm animals and list the differences between the digestive system of monogastric and ruminant animals.

S/No.	Divisions or Units of Contents	Time Allocated (Minute)	
	Systems of the body	Class	School Farm
1	Digestive system-monogastric and ruminant	13	18
2	Circulatory system	5	10
3	Reproductive system	9	26
4	Respiratory system	9	18
5	Nervous system	9	18
Total		45	90
Grand Total		135 minutes	(2hrs: 25minutes)

**Sources:** Agbulu and Ekele, (2004)

The remaining five programmes each as agricultural ecology and system, forest managements forage and pasture crops range management and agricultural engineering follow the same chart flow.

#### 4.0 Conclusion:

The educational system has typically created a class room of a single mold. The classroom has been teacher-centred and subject matter-oriented rather than student goal oriented. Students, however, have begun to resist this types instruction and have demanded a more flexible

type of curriculum which gives each student the opportunity to follow a variety of potential employment opportunities even though they are exposed to the same school curriculum. It is on this premise that preparing plans structuring modules for effective teaching becomes important in the business of teaching and learning.

### **5.0 Summary:**

In this unit, you have learnt that:

1. Agricultural Science and agricultural education are practically-oriented.
2. They are better taught through effective planning of lessons and structuring of modules.
3. The teacher and subject centered approach becomes obsolete at the expense of modular approach.

### **6.0 Tutor-Marked Assignment:**

1. What are the essential ingredients of a unit plan?
2. Define teaching plan and modular approach
3. How can you structure modules of instruction on animal production programmes?
4. What are the benefits of modular approach?

### **7.0 Reference/Further Readings:**

1. Agbulu, O. N. and Ekele, G. C. (2004)
2. Uga, O. (1985). *Curriculum Development for Africa*. Onitsha Africana-Fep. Publishers Limited.
3. *Functional Curriculum in Agricultural Education for Nigeria*. Makurdi. Welfson Press.

## **Unit 3: Methods of Teaching Vocational Agriculture**

**Content:**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Body
  - 3.1 Discussion Techniques
  - 3.2 Laboratory Experience
  - 3.3 Demonstrations
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

**1.0 Introduction:**

In general, there are three main kind of instruction: Individual, group and class. Individual instruction should be used for students having problems not common to a group of students or to the class as a whole. There must be provisions made for students of different levels of ability. This will necessitate giving some students more individual help than is given to others in the class. Group instruction should be provided for groups of students having similar problems. This may apply to groups such as young farmers' association and future farmers association (FFA), a group having the same project, students obtaining work experience in off-farm agriculturally oriented business and other groups having common problems (Phipps, 1963). Class instruction is most commonly used, since most students have problems related to the agricultural enterprises and businesses which occur most frequently in a community. It is on the basis of these categories that agricultural education could be effectively

taught discussion method, demonstration and laboratory method. These methods will assist agricultural students, the would-be farmers and those already in the business of farming to acquire desirable skills and knowledge for the sustenance of agricultural sectors.

### **3.0 Main Body:**

#### **3.1 Discussion Techniques:**

According to Phipps (1963), an important ingredient of many teaching-learning situations is group discussion. Discussion may be promoted in various ways. **Teacher as discussion leader:** The most frequently used model is for a teacher to act as the leader of the discussion. The teacher may vary this method by asking two or more students to lead the discussion of a problem or topic.

**Buszz and huddle:** A class may be divided into buzz and huddle groups to discuss goals, to discuss possible solutions to a problem, or to develop a plan of action. Each group needs a leader of the discussion and a definite assignment. The leader or the secretary of each group reports the results of his/her groups discussion to the entire class.

**Listening Team or Process Observer:** The teacher may improve discussions and introduce variety into the teaching process by designating one member of the class, or a team of class members, to observe and listen to the discussion. The task of the observer or team of observers is to listen to the discussion and report periodically what is being accomplished. Discussion listeners may evaluate the discussion process or question the group to help the discussion move forward.

**Researcher:** The teacher may wish to facilitate discussion productivity by designating a person in the class to serve as a recorder. The recorder

keeps a record of the issue discussed, the decisions reached, and the percentage of the group participating in the discussion. The recorder may be asked to report to the class periodically.

**Resource Persons:** The teacher may provide variety and enhance effectiveness in the teaching process by utilizing resource persons in the classroom. Resource persons may be used to generate interest in a topic or to provide information needed in the solution of problems. It is usually advisable to involve resource persons in a discussion instead of asking or permitting them to lecture the class.

**Lectures:** Lectures are not an effective teaching strategy unless the class members are adequately motivated to seek certain types of information and recognize that listening to a lecture is an effective way of obtaining the information desired.

**Panels:** A small group of persons may be used to discuss a problem in front of the rest of the class. The panel members need to be selected because of their special interest in the topic or because of their special knowledge of the area. They need to have a moderator who is the leader of the discussion. Panel members should discuss the topic among themselves and not be permitted to give a series of short speeches. Often the entire class is permitted to enter the discussion once the panel has generated interest in the topic.

**Symposium:** Panels and symposiums are often mistaken for each other. A symposium is the presenting of various of view on a topic by a series of speakers. It consists of a series of short lectures. It is not a discussion as with a panel. The chairperson may permit a limited number of questions after all speakers have presented their points of view. A teacher using a

symposium needs to designate the speakers in advance so they will have time to prepare their presentations.

**Colloquy:** A colloquy involves the use of two or three resource persons, who may be class members. These resource persons are presented with a problem class members. After the resulting discussion has generated sufficient interest, the entire class group may be drawn into the discussion.

**Role Playing:** In role playing, selected members of the class are asked to accept certain roles and act out in a spontaneous situation a certain human relations incident. It is an effective way for students to understand the feelings and attitudes of others. It is also an effective procedure to translate an intellectual activity into both an intellectual and an emotional experience.

**Dramatic Skit:** A dramatic skit or play may be used for the same purposes as role playing. The difference is that, this is not a spontaneous acting out of roles. With a dramatic skit, the dialogue is written in advance and presented by the participants. The parts are usually read instead of being memorized. A dramatic skit may be used as an appropriate part of the total problem solving procedure.

**Brainstorming:** Brainstorming is an attempt to solicit from a class as many hypotheses as possible for the solution of a problem. It is a creative effort. Hypotheses or creative solutions to a problem are not evaluated when presented. All ideas are accepted and recorded. Ideas are not discussed regarding their feasibility or value. Brainstorming is a variation

in the discussion procedure and may be used, when appropriate, to release inhibitions of class members and to create interest.

### **3.2 Laboratory Experience:**

As contained in the epistle of Phipps (1963), the use of laboratory experience is an important tool in the over all problem-solving procedure. Laboratory experience varies class procedure and is an effective teaching tool. It utilizes many senses and provides for physical activity. Laboratory experiences may be used to point up problem or to find out solutions to problems. Such experiences may be provided in class room laboratories, in greenhouses, on land laboratories, and in the community.

**Field Trips:** Within the frame work of the problem - solving procedures, field trips are an important ingredient. Field trips may be used to help students recognize and define problems. They may also be used as a source of information to solve problems. Field trips involve directed observations.

### **3.3 Demonstrations:**

The problem-solving procedure involves much more than discussion. It often requires the use of demonstrations. Demonstrations may be needed to teach manipulative skills, or to assist in gaining acceptance of new ideas or practices. This latter type of demonstration is called a "result demonstration" and the former, a "method demonstration". (Phipps, 1963). A demonstration of a certain skill in welding might be used to illustrate a method. A demonstration of the strength of a certain weld might be used to illustrate a result.

**Visuals:** Within the frame work of the problem-solving procedure, visuals of all kinds need to be used, such as overhead projectors, chalk boards,



pictures, movies, T.V., real objects, simulation visual, etc. Visuals may be used to help students recognize or define problems. They may also be used to provide the information or skill necessary for solving problem.

**Tape Recorder:** Audio aids are often an important ingredient of the problem-solving procedure sounds may be recorded with a tape recorder and used in the classroom. For example, certain malfunctioning sounds of machinery may be recorded and introduced in the classroom at the appropriate time. Some times it is not possible to get certain resource persons to meet with a class. Often it is possible to record their contribution in advance with a tape recorder (Phipps, 1963).

**Tests:** Tests, written or oral, may be used as a teaching strategy instead of as a summative evaluation device. A short test with an immediate feedback may be used to stimulate interest in an area. When tests are used in this way, the students must understand that they are being used not for summative evaluation purposes, but for diagnostic purposes (Phipps, 1963).

#### **4.0 Conclusion:**

Vocational agriculture is practically-oriented and thus requires practical approaches and methods that could instill skills and knowledge in the recipients. It is time that no single method of teaching is best; a good and knowledgeable teacher is one who combines attributes of various teaching methods. The discussion, demonstration and laboratory techniques are used in the classroom as well as in the school farm. Both students and teachers are actively involved in the business of teaching and learning.

## **5.0 Summary:**

In this unit, you have learnt that:

- There are varieties of teaching methods but the most acceptable one for laboratory and demonstrations.
- Vocational agriculture is practically-oriented and is thus taught practically both in the classroom and land laboratory.

## **6.0 Tutor-Marked Assignment:**

1. How is vocational agriculture taught to youths and adults both in the classroom and on-the land laboratory?
2. Briefly discuss demonstration and laboratory methods of teaching.
3. What is Brainstorming and colloquy?
4. Why is test used for both teaching and assessment?

## **7.0 Reference/Further Reading:**

Phipps, L.J. (1963). Handbook on Agricultural Education in Public Schools. Danville, Illinois. The Interstate Printers and Publishers, Inc.

**Unit 4:** Young and adult farmer courses in school

### **Content:**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Body
  - 3.1 Objectives of Courses for Young and Adult Farmers
  - 3.2 Types of Courses
  - 3.3 Organizing Young and Adult farmer Course
  - 3.4 Developing Course Contents for Young and Adult Farmers
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment

## 7.0 References/Further Reading

### 1.0 Introduction:

Courses in agriculture for young and older farmers provide systematic instruction concerning practical farm problems and activities (Phipps, 1963). Phipps posits that these courses are organized for persons who have entered upon the work of the farm. The enrollees of a course carry on farming activities involving the use of approved practices related to the course of instruction under the supervision of the teacher of the course. Adult and young farmer courses are established under public school supervision and control.

### 2.0 Objectives:

By the end of this unit, students should be able to:

1. Outline the objectives of young and adult farmer courses
2. Explain the desire to organize young and adult farmer courses

### 3.0 Main Body:

#### 3.1 Objectives of Courses for Young and Adult Farmers:

As contained in Phipps, (1963), the primary objective of courses for young and adult farmers should be to develop the ability of farmers through systematic instruction to solve their problems intelligently and to perform the manipulative jobs needed on their farms. The objectives are as follows:

- 1 To provide up-to-date information involving approved practices pertaining to farming.
- 2 To develop abilities of farmers which will enable them to perform their necessary farm mechanics jobs

- 3 To develop abilities which will improve the management of their farm business
- 4 To develop abilities for "farm-family living" programs
- 5 To develop abilities in food production and conservation
- 6 To develop abilities in cooperative activities which will result in desirable farm practices
- 7 To develop abilities which will result in making their farms better places to live.

Phipps also presented teachers objectives for young and adult farmers thus:

- 1 To help change or improve certain farm abilities in the community as a whole and to extend the educational services of the school and the programme of vocational education in agriculture to a larger percentage of the community
- 2 To make new friendships and thus increase the effectiveness of the school's programme
- 3 To lower the per capital cost for the agricultural instruction
- 4 To help create and maintain desirable attitudes between the farmers and the public school
- 5 To afford an opportunity for the teacher of agriculture to render educational services in the community

### **3.2 Types of Courses:**

Farm mechanics courses in the repair, maintenance, adjustment and construction of machinery and equipment have been very popular among young and adult farmers. Farmers in this type of course develop the necessary abilities to repair, maintain and adjust their farm machinery

and to construct many labor-saving devices. In surveys, farmers indicate that they receive the following values from farm mechanics courses:

- 1 Development of abilities to adjust machinery and make minor repairs
- 2 Opportunity to use tools and equipment before purchasing them for their home shops
- 3 Development of abilities needed to construct simple farm machines

According to Agbulu, (2002) and Phipps (1963), courses in dairying, Poultry, swine, field crops, feeds and feeding, soil conservation and farm management always have been important and will continue to be important. They posit that, efficient production will always be essential in successful farming; consequently, farmers will continue to need courses in which they can discuss approved practices and efficiency measures of production. In the past, insufficient emphasis has been placed on courses of this type in many communities. A large number of such courses should be promoted in the future if the adult education needs in agriculture are to be met.

Farm-family living and rural citizenship courses meet a real need. Young and adult farmers welcome instruction on the ways to better their farm-family life and on the understanding of local, state, country and national problems and their relationships to agriculture and to them as farmers.

**Food Production, Conservation and Processing Courses:** For farm families are popular advantages often listed for courses in food production and processing are as follows:

1. Training in food presentation is obtained.
2. Equipment for food processing not found at home is available.
3. Time and labour spent in food presentation are reduced.

**Farm Business Management Courses:** Farm business management courses for farm families have been very successful in several states. These courses are based on the keeping and interpreting of farm records and the organization of the farm business, in line with family goals, as a result of the analysis and interpretation of farm records. This type of course has been most successful where support services are available for summarizing and analyzing the farm account records.

**Characteristic of Youth and Adult Farmers:**

1. They are interested in gaining new knowledge and in developing needed skills. They attend courses for a purpose.
2. They are interested in selecting and adopting approved practices which will work successfully for them.
3. They are interested in relating their experience if tactfully approached.
4. They want to develop abilities which will assist them in their farming activities. They desire to learn - by - doing.
5. They are capable of thinking through their problems.
6. They desire practical information which they can use.
7. They are interested in cooperating for the good of the community.
8. They have considerable creative ability.
9. They are not interested in fads and frills.
10. They are appreciative of the education provided.
11. They are the persons who have a major part in making an agriculture teacher's job secure (Phipps, 1963).

**3.3 Organizing Young and Adult Farmer Courses:**

According to Phipps, (1963), the procedure is that, before teachers attempt to organize young and adult farmer programmes, they should consult their principals, farm superintendents, directors of vocational education and school boards. They should explain to them the aids and values of adult farmer courses, ask for their support, and receive their cooperation before organizing courses. After they have received permission to undertake young and adult farmer programme, they should meet with an advisory council to determine the needs for instruction. They should then survey facilities and available special instructors.

The following are the recommended successful practices in organizing young and adult courses:

1. Study community needs with the help of the advisory council.
2. Determine with the help of the council the more pressing agricultural needs of the community.
3. With the help of the council, organize an advisory committee for each of these needs.
4. Use advisory committees in organizing specific adult courses.
5. With the help of each advisory committee, determine the objectives and ways and means of evaluating the young and adult courses it is sponsoring.
6. With the help of advisory committee, determine the place and time of courses. Locate course centres for the convenience of the enrolls.
7. With the help of the advisory committees, determine the number of farmers to enroll in each course.
8. Ask advisory committee members to enroll class members. Provide membership card.

9. Place a preliminary news announcement in the newspapers at the time the advisory committee is enrolling members.
10. Hold another meeting of the advisory committee to check on persons enrolled in the course. Also begin making preliminary plans for the first few meetings of the course.
11. Visit each class member who has been enrolled by an advisory committee member, before the first meeting of a course.
12. Hold an advisory committee meeting to prepare detailed plans for a course.
13. Place articles in the local newspapers, giving time and place of the meetings, a few days before the first meeting of a course.
14. Send out a reminder card announcing the first meeting.
15. Hold for the purpose of evaluating the course and making further plans.
16. Place in local newspapers periodic news articles concerning a course.

**A Sample of Membership Card for Young and Adult Farmers:**

Vocational Education in Agriculture..... School

This certified that:.....

Is enrolled in the adult farmer course on:.....

.....

For the school year, 20:.....

.....

Instructor

Enrolled by:.....

Advisory Committee Representative

**Source:** Phipps, (1963) P430



**News Items:** Occasional news articles are a desirable means of informing farmers of the young and adult farmer programme being conducted by a school. News articles make the work of advisory committee members easier when they are recruiting enrollees for a course. Farmers who have read a news item about a proposed young and adult course are prepared to discuss their enrollment intelligently when asked to enroll by committee members. A news article announcing a course also informs prospective class members who are not asked to enroll by a committee member about the course so that they can enroll in the course at the school. Occasional news articles may be used during the programme of a course as a means of keeping a community informed.

**Circular Letters:** A circular letter is sometimes used to announce a course and pave the way for the securing of enrollment by advisory committee members. The following circular letter illustrates one type that may be used.

.....  
.....  
.....Date.....

As you know, the production of potatoes is the main source of income in this community. We plan to conduct a course at the high school for farmers interested in making greater profits from their potatoes. The first meeting will be held at 7:30am next Tuesday, October 14, 2009 in the agricultural classroom.

Some problems which have been suggested by potato growers are: when is the best time to harvest potatoes? What methods are most satisfactory

in harvesting potatoes? What grading methods are best? What advantages are to be gained by marketing co-operatively? What markets are best for this community? These problems and many others will be discussed by the growers of this community.

I am sure the discussions will be both interesting and profitable. If you desire to enroll in the course, please do so as soon as possible. The enrollment in the course will be limited to 20 farmers. We will be expecting you.

Very truly yours  
R. W. Johnson  
Agriculture Instructor

**Source:** Phipps, (1963) P 431.

**Deciding on Courses to Offer:**

The courses offered should be based on the interests, needs and capabilities of the farmer. Courses must be selected for which qualified instructors and adequate facilities can be secured. It is impossible to select courses that are of interest to everyone in a community, as there are many diversified interests in most communities. However, it is important to select courses that are needed and to secure enrollees who are interested in the instruction and who will benefit by it. Using a general advisory council to study the needs of a community is one of the best procedures for deciding on the courses to offer. After this has been done, an advisory committee for each of these needs may be established to organize adult and young courses for each need or for those that are most pressing.

### 3.4 Development Course Content for Young and Adult Farmer Courses:

Detailed course planning is based on the general principles of developing a programme of agriculture which is also dependent on the principles of the teaching. The principles of teaching include: democracy; use; readiness and learning-by-doing.

**Democracy:** The first prerequisite of good teaching is democratic behaviour by teachers. This means that teachers treat their students as they would like to be treated. They practice the "golden rule".

**Use:** Teachers and students should be primarily concerned with knowledge and skills which may be used now or in the near future. Use is mentioned because traditionally we have been teaching for the future. We try to teach students who may be preparing for off-farm agricultural jobs how to raise sheep, for example, because of a pious belief that somebody they might raise sheep. It is very difficult to teach for future use. Those who try to disregard how fast people forget that which they do not use and they find that their students soon lose interest and do not learn what is being taught. Instead, they learn to dislike what is being taught. An example, might be record keeping. Record keeping taught without analysis and interpretation probably teaches students not to keep records instead of teaching them to keep records.

**Readiness:** Readiness is closely related to use. It is useless to try teach something to students before they are ready to learn it. Students may be ready to learn something because they have no immediate use for it.

**Learning-by-doing:** We learn what we do. If we merely talk about agricultural problem, we learn only to talk about agricultural problems. Instruction needs to be based on those activities which students anticipate doing or are doing, and the instruction is not complete until

they have used the ability being taught. It is not enough to teach about some job in class. Information may not carry over from the classroom to the farm or agriculturally-oriented business. Classroom instruction must be based on agricultural activities, and what is learned in class should be used in performing these activities. Learning-by-doing is closely related to use and readiness.

The successful development of an effective programme of agricultural education is facilitated by the use of advisory council and committees and by the development of written policies. The following steps are carried out in developing course contents for young and adult farmers having considered the principles of teaching and general principles of developing a programme of agriculture. A course plan is a detailed presentation of the overall programme of the department, and its development should be based on the general principles of effective instruction.

Agricultural subject matter for production agricultural occupations and for off-farm agricultural occupations maybe divided into four levels. They are: operational; skilled; technical and professional. Most occupations have workers at all four levels. For example, at the operational level a worker could operate a machine. At the skilled level the worker would be able to operate and repair the machine. At the technical level the worker could build the machine, and at the professional level the worker would design the machine.

**Proper Content Essential:** It is very important in developing the content of a course to make sure that it contains activities which provide for learning-by-doing. According to Phipps (1963), the success or failure of young and adult farmer course is largely dependent on the course content and the teaching procedures used by the instructors. Provision must be

made in a course for the development of essential abilities, skills, attitudes and understandings pertaining to the immediate problems common to the farmers.

**Teacher Plans:** Planning done prior to the first meeting of a course is of value in getting a course off to a good start. The following procedure is suggested:

- Review the local situation through surveys, the immediate problems of the enrollees.
- List the abilities you hope enrollees will develop.
- Consider the facilities available for developing needed abilities.
- Decide on the objectives of the course-that is, what you hope to accomplish; and decide on how you propose to achieve the objectives.
- Consider the qualifications and abilities of the special instructor if one is to be used.
- List the activities or problems you propose to include in the course.
- Review these activities with the advisory committee for the course and make any revisions that are necessary.
- Use the proposed outline as a guide in developing the course content with the enrollees at the first meeting.

**Selecting Course Problem Areas:**

At the first meeting of a course, the instructor should discuss and formulate with the enrollees the objectives of the course. The farmers should then be given an opportunity to suggest the problem areas and activities they think should be included in the course. These activities

may be listed on the chalk board by the instructor. The instructor and the group should then review this list, keeping the following in mind:

- The specific needs of the farmers enrolled.
- The facilities available.
- The availabilities of essential experimental data.
- The activities which will provide for the development of needed abilities.

After these problem areas and activities have been carefully evaluated in terms of need and after the feasibility of including them in the course has been discussed, selection of problem areas and activities may be made. These may then be listed on the chalk board by the instructor approximately in the order in which they will be discussed in the course, considering the seasonal sequence of each problem areas activities which are closely related should be taken up consecutively in order to bring out interrelated associated information.

#### **4.0 Conclusion:**

It is true that adults geometrically age out of farming business. It is equally true that youths are better nurtured to replace these going farmers by introducing and integrating interested courses through effective development of course contents. Exposure of both youth and adult farmers to the seven programmes in agriculture equips them with saleable skills and knowledge for better productivity of sustenance of agricultural produce and products for the rural poor and growth of our economy.

#### **5.0 Summary:**

In this unit, you have learnt, that:

- Both youth and adult farmers have opportunity to obtain up-to-date information involving approved practices pertaining to farming.
- Both youth and adult farmers cherished courses that are practically-oriented and have quick returns.
- Courses for youth and adult farmers are iteratively planned for effective instruction.
- The basic principles of teaching should be considered first in the development of course contents for agricultural educators.

#### **6.0 Tutor-Market Assignment:**

1. Who are the youth and adult farmers?
2. Discuss three (3) pertinent principles of teaching.
3. How are course contents developed for young and adult farmers?
4. What are the recommended practices for organizing young and adult courses?

#### **7.0 Reference/Further Reading:**

Agbulu, O. N. (2002), *Methodologies of Vocational Agriculture and Guidance*. Makurdi Aboki - Publishers.

Phipps, L. J. (1963), *Handbook on Agricultural Education in Public Schools*. Danville, Illinois. The Inter State printers and Publishers Inc.

## **Module 2: Organization and supervision of school farm**

### **Content:**

#### **Introduction:**

**Unit 1:** Management of school farm

**Unit 2:** Practical teaching on the land laboratory

**Unit 3:** Record keeping in the school farm

**Unit 4:** Responsibilities of farm supervisors

**Unit 1:** Management of school farm

### **Content:**

1.0 Introduction

2.0 Objectives

3.0 Main Body

3.1 Farm Management I

3.2 Farm Management II

3.3 Farm Management III

4.0 Conclusion

5.0 Summary

6.0 Tutor-marked Assignment

7.0 References/further reading

#### **1.0 Introduction:**

Agricultural Science as reported by (Olaitan, 1978) was introduced into secondary schools and became an examinable subject after the independence in 1960. teaching of agricultural science then favoured cognitive ability than the possession of practical skills. This revelation hailed from the work of Okorie in 1975 on manipulative teaching of agricultural science in secondary schools. He reported that students'



performance have been evaluated through paper and pencil technique and that students who never attended farm practical are known to pass with distinctions. Observation has shown that this instructional strategy remained in the school system until Nigerian government saw the need to review the educational system to suit the advent of modern technology.

After the implementation of the 6-3-3-4 education system, awareness gripped Nigerians in areas of skill development for occupational placement in the world of work especially in agriculture and allied industries. In most recent times, concern for skill-development in agriculture raised the status of school farm in the secondary schools education system.

Mba, (1991), worked on the attitudes of students, parents and teachers towards practical agriculture. The findings of this study revealed that: both students and parents indicated in their opinions that the socio-economic and socio-cultural values attached to the teaching of practical agriculture include the fact that every member of the society should engage in agriculture. Students should show interest in agriculture in the school and after school and after schooling. There was no significant difference in their opinions with regard to the values attached to agriculture in junior secondary schools. The findings indicated that many products of junior secondary schools did not take up farming on their own to earn their living, or took jobs with some agricultural industries. It was also revealed that these school leavers in question, did not gain admission into farming training centres. All these information triggered the quest for effective management and supervision of school farm which is the laboratory for agricultural students.

At the outset in the study of management, it has to be recognized that whilst farms must be planned and run on business lines, the biological nature of agriculture, together with an inherent variability and uncertainty, frequently requires decisions to be taken and implemented on the basis of incomplete information. However, it is important to obtain as much information as possible to increase the chance of success.

Each student or farmer has objectives for his/her business. Management is concerned with ensuring that these objectives are attained. Management concepts assist individual or student to consider the organization of resources into a suitable plan. Once the plan is in operation, the results have to be recorded. These are then analyzed and appraised to establish what they indicate. In farm management, capital, land and students are the primary determinants. However, school farm management is structural into management I, II and III.

### **3.0 Main Body:**

#### **3.1 Farm Management I:**

Contact the student farm, explain the farm business management programme, discuss soil and feed sampling procedures, setting up good farm records, planning a fertilizer programme, protecting livestock rations, beginning accurate complete farm records, projecting, cash flow, cropping plans and projections, assistance in record keeping, updating feed records, projecting possible returns, discuss useful computer software programmes (where possible), the mid-year feed back, observing crop progress, comparison of cash flow, recording crop data, soil analysis, feed analysis, completing crop data, planning livestock rations, making an income tax estimate, checking the competence of the farm record system.

### **3.2 Farm Management II:**

Completing the farm records for analysis, organizing the records for tax filing, beginning the interpretation of the annual analysis report, using the analysis to evaluate crop costs and returns, using the analysis evaluate livestock enterprising analyzing overhead costs, determining progress on the yearly cash flow, checking completeness of the records system, income tax estimate, planning machinery purchases, completing the farm accounts and income tax management.

### **3.3 Farm Management III:**

Projecting cash flow, evaluating the net worth structure, planning a credit programme, planning most effective use of labour long range crop and fertilizer plan, development of a programme of land drainage or irrigation, evaluating the farm business, developing and marketing plan, studying trends, determining strengths and weakness, planning facility needs, analyzing crop costs and returning, feed values, new crop practices, evaluating the livestock programme, planning improvement programmes, closing the farm records for analysis and income tax management.

Effective farm management and management of school farm depends on in-depth knowledge of farm records. So far success in agriculture, both in the classroom and on the farms, students should be taught how to keep accurate farm records. Techniques of record keeping should be taught in stages. Before the class, the teacher should prepare his lesson very well. Each lesson on farm records should emphasize: the usefulness of each farm record, how to use farm records, important farm records to be kept

in school such as farm diary, labour analysis, cash account, crop yield record, produce account record, manure record, purchase and inventory, livestock records, breeding records, sales records and management. Basic purpose of farm records are as follows: farm records provide the history of farm operations from one period to another, this enabling comparison to be made, records reveal how much it costs to produce a particular item on the farm; from farm records, a student or farmer can tell where he has been most efficient in his farm operations; records are essential for legal purposes (they provide information from which income tax is calculated); good farm records help farmers to obtain loans more easily from banks or other money lending institutions; records enable farmers to do better job of planning future farm projects; or expansion of existing projects; record keeping trains the farmer to become a good observer of his agricultural pursuit.

Typical farm records to be taught to students include: the inventory, farm diary and labour analysis, cash account, crop yield record, produce account record and manure record. Adequate record keeping is a inevitable activity on the school farm. All the seven programme areas such as crop production; animal production; forest management; pasture and for age crops; range management and improvement; agricultural ecology and systems and agricultural engineering require effective data storage and information documentation. Admittedly, record keeping is a prime unit under school farm management. Therefore, students' active involvement in knowing how to keep various records on the farm is an added opportunity in stall development for occupational placement. Inventory is used for recording the values the of items students and

teachers have at hand at the beginning of a farming programme and also at the close of the programme. The price of each item is entered on the inventory form. The actual market values of the items should be used. Farm diary and labour analysis are day - to- day operations on the farm. It is a summary of how much labour has been expended on each crop or item for a whole month. The record is always in two parts

- (A) A record of the operations performed, the number of hours spent and the number of boys/girls employed during the period.
- (B) A summary of the amount of labour in the farm of working hours expended on each crop or job. Entries are made immediately at the end of any one operation. From the record, it will be easy to deduce the number of hours students work on the farm in a month.

Students keep record of expenditure and revenue of the farm and the amount of cash to be saved. When any money is realized from the sale of produce is credited and when any money is spent on materials for the farm, the farm account is debited. Cash account tells the viability and productivity of a farm operations for a particular year. Students are actively involved in adequate documentation of crop production activities and yields derived in the process. The crop yield record gives information about the planting distance of the crop; the variety; dates of planting and the yield per hectare. When crops are harvested, they are weighted on the spot. To weight the crops on a balance, the weight of the crops and the container is known and this is called the tare weight. The weight of the crops and the container is known as the gross weight. The actual weight of the crop could be obtained by subtracting the tare weight from the gross weight to give the net weight. The following information could form the content of crop yield record; year of planting; variety; sub-point number; area; date of planting; crop planted; planting

density; date of harvest; grades of crop (large; medium; small); yield (gross kg; net kg) and number kept for further planting. The produce account record tells students something about the cash value of the crops from the farm, no matter how it is put into use. The cash value of the produce is always based on the current market price of similar produce at the time of harvesting. At the end of the farming season, the total cash value of the food items produced will show the amount that would have been realized assuming that all the crops produced had been sold.

Manure and livestock records provide details about type of manure, quantity applied and method of application. Similarly, annual records hold the production ratio of each animal, rate of food conversion and food intake, production of milk and weight of the animal. The livestock record will assist students in deciding which animals should be eliminated from the farm. Other information contained in the livestock record include; information on breeding, weaning, feeding, culling, sales, health care and management. In a nutshell, effective management of school farm hinges on adequate record keeping of all activities within the rhymes of pre-planting, planting and post - planting phases.

#### 4.0 **Conclusion**

Management of school farm encompasses all activities integrated and harmonized for high productivity within pre-planting, planting and post-planting phases. Management which includes planning, supervision, implementation of policies financing and decision making requires active participation of students, teachers and farm supervisors. Management of school farm is so tasky and laborious. It requires fuel commitment of all beneficiaries as deviations could mar the desired productivity and intellectual benefits.

## **5.0 Summary**

In this unit, you have learnt that:

- Management of school is a prelude and precursor for effective utilization of land laboratory.
- Activities under the management of school farm are split into management.
- Record keeping is a cardinal stand behind successful management of school farm.

## **6.0 Tutor - Marked Assignment):**

1. Define management and management of school farm.
2. Management of school farm has three components; list and discuss activities within the first management phase.
3. How are records kept on the school farm and who keeps them?
4. What are the major contents of diary records on the farm?

## **7.0 Reference/further reading**

Agbulu, O.N. & Ekele, G.E. (2004). *Functional Curriculum in Agricultural Education for Nigeria*. Makurdi. Welfson Press.

**Unit 2:** Practical teaching on the land laboratory & class laboratory.

### **Content:**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main body
  - 3.1 Developing manipulative skills
  - 3.2 Instruction on the farm
  - 3.3 Conducting an agriculture mechanics class
- 4.0 Conclusion

- 5.0 Summary
- 6.0 Tutor-Marked Assignment (TMA)
- 7.0 References/Further Reading.

## **1.0 Introduction**

Agricultural Science and Agricultural Education are better taught to students through learning - by - doing. This practically substantiate the fact that they are practically oriented. Therefore, emphasis is majority placed on doing rather than thinking and cherishing, though the three domains are quite useful in teaching practical topics.

Manipulative jobs may be taught in combination with managerial problems, or they may be taught separately. For example, in dealing with the problem of how to adjust the timing on a tractor, there may be a number of questions pertaining to the problem which the students will need to study and discuss before actually performing the task. They may want to know when to time, what procedures to follow, what equipment will be necessary etc. In this case, a discussion may be conducted pertaining to these problems before manipulative skills are developed (Phipps, 1963).

## **2.0 Objectives**

By the end of this unit, students should be able to:

- Set up procedures for carrying out a named practical.
- Conduct an agriculture mechanics class.

## **3.0 Main body**

### **3.1 Developing manipulative skills**



The job instruction training method can be successfully used in teaching skills. The four basic steps in job instruction training, with directions for their execution are as follows;

**Step 1: Prepare the Learners.**

- Get students' complete attention on the job.
- Find out what they already know about the job.
- Get them interested in learning the job. Show its importance.
- Place them in the correct position

**Step 2: Present the Operation**

- Tell, show, illustrate and question.
- Take up one point at a time.
- Stress key points.
- Point out safe working habits.

**Step 3. Try out performance**

- Have the students perform the job.
- Have them tell and show you
- Have them explain key points.
- Ask questions and correct errors
- Continue until you know they know.

**Step 4: Follow up**

- Put the students on their own.
- Advise them clearly regarding what to do in emergencies.
- Check their work on the job to make certain they are performing the job correctly.

**3.2. INSTRUCTION ON THE FARM**

Teaching on the farm during a visit should exhibit the same general methods recommended for use in the classroom. The difference is

that much of the teaching is individual. The teaching on the farm should develop out of, and be an extension of, the teaching done in the classroom, and vice-versa. Some problems encountered should be brought back to the classroom for more extensive and intensive consideration. The application of this theory requires planning. Planning for on-job instruction can usually be done in advance during classes. If the students request the consideration of problems during individual instruction, preventing the use of the time for follow - up of previous instruction, it may be that the instruction in the other phases of the program is not geared to the real interest and needs of the group (Prupps, 1963).

### **3.3 Conducting an Agriculture Mechanics Class:**

The following procedure has been used in a number of schools in conducting classes in agriculture mechanics.

#### **Step 1: Open the class period.**

It is important that an instructor begin each instructional period in a business like way. It may be necessary to be at the shop some time in advance of the students to be sure that every thing is ready for the instruction.

- Dress in clothes suitable for the work to be done.
- Begin work at the time scheduled. Encourage all students to be on time and to remain in class until closing time.
- Plan in advance worthwhile jobs or projects for all enrolled in the class.
- Arrange for each student to have sufficient working space and the equipment necessary for the job to be done.
- Have all tools, equipment, and supplies on hand.
- See that the shop is clean and that everything is in its proper place.
- Be courteous, friendly and patient.

- Show interest in the students and answer questions clearly.
- Provide an environment that will stimulate desirable work habits  
(Adapted from misc. pub.2611. U.S. Office of Education, Washington B.C).

Step 2: **Develop the students' interest in each job and supply basic information**

In general, it is expected that students will have a genuine interest in the jobs that are to be undertaken by them. In case there is not a natural interest on the part of the students, the instructor, before attempting to teach the students how to do a job, should plan a method of arising student interest. The instructor should also plan some procedure to follow in helping students to secure basic information pertaining to the job.

- See that the students are at ease
- Ask questions which will arouse student interest in doing the job
- Discuss reasons why the job is important
- Have students, when possible, study references pertaining to the job to be done.
- Discuss the various skills or techniques required to do the job
- Call upon individuals in the group to give briefly their experience in doing similar jobs.
- Explain and show tools, equipment, and materials necessary in doing the job
- Explain procedures that will be followed in doing the job
- Take students on a field trip, if necessary, to acquaint them with the job being done.

Step 3: **Demonstrate jobs.**

The demonstration is one of the important procedures in teaching a shop class. It must be well done to be effective.

- Be sure tools, equipment, and materials are available before starting a demonstration.
- Give the demonstration with the class arranged so that each student can see and hear exactly what takes place.
- Demonstrate each step slowly, using the proper safety precautions.
- Call attention to each step by making comments and explanations and by questioning students. Encourage the students to think through the demonstration by asking questions. Call attention to safety precautions.
- Encourage the students to ask questions to clarify any step or problem.
- Ask the students to demonstrate various phase, of the job.
- Encourage the students, in some cases, to take notes or make sketches for future use and study.
- Have students examine the finished job for quality of work how to proceed.

Step 4: **Secure student participation**

Any demonstration or other instruction not followed by student participation is almost useless. Plans for student participation, therefore, must be carefully made.

- Have students do the job or perform certain operation immediately following the demonstration.
- Provide for student participation until desired skills and abilities are acquired by the different students.
- Teach the students to think and reason for themselves, and show them how to find new information necessary for solving difficulties in doing the job.
- Provide for the amount of repetitions training necessary for the students to develop skills.

Step 5: **Teach while the students are at work.**

Learning is a continuous process. Students will not acquire all the information and skills they need during the demonstration or discussion period. They will need supplementary instruction. Much of this can be provided while the students are at work.

- Ask students why they do the job in a certain way.
- Give individual help but do not do the job for a student.
- When the need arises, call the group together and redemonstrate any step or skill, or point out why certain mistakes are being made.
- Recognize good quality work and call it to the attention of individuals and the group.
- Have students evaluate their own work by comparing it with an accepted standard, and let them tell how they think the job could be improved.

Step 6: **Check individual performance.**

It is important for the instructor to be alert at all times in checking the performance of each member of the class. The instructor may do this by moving from student to student or from group to group while they are at work.

While doing this, the instructor should:

- Inspect the work quality as the job is progressing.
- Check to see that the proper tools are selected and used correctly.
- Inspect the steps being followed by the individuals in the performance of skills.
- Check safety measure, being followed.
- Record the proficiency of each individual.
- Record jobs that are completed by each individual student or group students.

Step 7: **Close the work period**

The instructor must remember that other classes will be using the shop. It is very important, therefore, that the shop be left clean and in order.

- Have students clean and put away tools.
- Check tools to see that they are all in place, and look the cabinets or tool room.
- Have students mark and put in a safe place the materials with which they are working.
- Give students, definite responsibility in cleaning the shop and in leaving everything in order.
- Call students together to review progress made during the period and to plan for the following period.

Step 8: **Review accomplishments of class period.**

Immediately after each work period, the instructor should review for his/her own use the things that have been accomplished and the procedures which were followed in carrying out the instruction.

- Was every student fully occupied with worthwhile activities throughout the period?
- Was the quality of each student's work sufficiently high?
- Was each student interested in the job and did he/she take pride in it?
- Did each student use the tools correctly and in a professional manner?
- Did each student keep the tools in good working condition?
- Were all students properly dressed for the type of work done?
- Did each student clear and return the tools to the proper place?
- Were there any violations of safety precautions?

- Was the instructor properly dressed for the work to be done (Phipps, 1963).

#### 4.0 Conclusion

Practical lessons are iteratively arranged for successful attainment of saleable skills and knowledge in the programme areas of agriculture. Practical lessons are characterized by identifying the major objective in a practical term, procedures for carrying out the assignment, necessary tools required for the lesson and performance of the task. Practical lessons are both conducted in the classroom and on the land laboratory.

#### 5.0 Summary

In this unit, you have learnt that:

- Developing manipulative skills requires 8 steps (prepare the learner, present the operation, try out performance, follow up)
- Teaching on the farm is majorly personal.
- Conducting an agriculture mechanics class requires 8 steps (open the class period, develop the students' interest in each job and supply basic information, demonstrate job, secure student participation, teach while students are at work, check individual performance, close the work period and review accomplishments of class period).

#### 6.0 Tutor-Marked Assignment (TMA)

1. What is practicum?
2. How is tractorization taught on the farm?
3. Outline steps involved in teaching manipulative skills in a named crop?
4. Explain in detail the following:
  - (a) Secure student participation

(b) Check individual performance

(c) Renew accomplishment of class period.

## **7.0 References/further Reading**

Phipps, L.J. (1963). Handbook on Agricultural education in public schools. Danville, Illinois. The interstate printers & publishers, Inc.

## **Unit 3: Analysis of farm accounts and records.**

Content:

1.0 Introduction

2.0 Objectives

3.0 Main body

3.1. Adjusting the accounts for inter farm comparison.

3.2.1 Definition of input and output terms

3.2.2 Calculation outputs, costs

3.3 Calculation of performance measures

3.4 Factors affecting the level of output

3.4.1 Gross margin analysis

4.0 Conclusion

5.0 Summary

6.0 Tutor-marked Assignment (TMA)

7.0 References/further Reading

1.0 **Introduction**

A study of past financial result helps uncover any points of weakness in the organization and management of a farm business. Ideally, the results for two or three years should be studied, since one year's results may have been influenced by exceptional circumstances. However, where only one year's



results are available some guidance can be obtained about a farm as a basis for tentative future plans.

## 2.0 Objectives

By the end of this unit students should be able to calculate output costs, gross margin and performance measures.

## 3.0 Main body

### 3.1 Adjusting the accounts for interfarm comparison

Before calculating a number of sample performance measures, for comparison with standards published by various universities, certain adjustments to the accounts must be made. These adjustments are as follows:

- A charge should be made for unpaid family labour, of sons and daughters, equivalent to the hired labour rate. Amount included in the accounts for tax purposes of wife's wages, where no physical labour is done, should be deducted;
- In the case of an owner-occupied farm a rental charge should be entered, based on the level of rents paid in the locality. Any rents received should be excluded; exclude interest charges of all types;
- Check the machinery depreciation item - if the allowances claimed for income tax purposes have been given, these could be significantly different from the true decrease in value. This will be particularly noticeable when the maximum permitted first year allowance has been taken and could materially upset the inter farm comparisons. It is essential, therefore, to eliminate this high figure from depreciation or at least be aware that it is inflated. The best way of overcoming this problem is to record separately the new machinery purchased within the years;

- Allowance should be made for the private use of farm vehicles and of the farm house, and for farm produce consumed in the farmhouse or supplied to workers for which no payment is made;
- Exclude non-farming receipts and expenses;
- Specific subsidies received for livestock and crops, eg calf subsidies and cereal deficiency payments, should be added to the output of the appropriate enterprises;
- The revenue must be adjusted for any valuation charges in sale products and, in the case of livestock, for livestock purchases;
- Lime and fertilizer subsidies must be deducted from the costs of these items;
- Expenditure on seeds, feeding stuffs and fertilizers must be adjusted for evaluation changes, in order to express the true input of the resource in question during the years;
- Expenses and receipts for produce bought for resale should be excluded;
- The value of purchased stores which are sold should be deducted from the cost of that item; exclude costs of paid management.

Small charges amounting to only a few naira can be ignored but any that appears likely to affect the profit appreciably must be taken into accounts, composite items, eg. 'feeds, seeds and manures' and livestock purchases', must be broken down. A well-prepared set of accounts will make a farm business analysis an easy undertaking. The valuation should be in sufficient detail to permit the output for each enterprise to be calculated separately.

### **3.2.1 Definition of input and output terms.**

Once the above adjustments have been made, the inputs and outputs from the accounts can be recast into a management account. The definition of relevant terms are given below;

- Gross output is total returns plus the value of produce consumed in the farm house or supplied to workers for which no payment is made, less purchase of livestock, livestock products and other produce bought for resale.
- Gross output of crops is total returns from crops plus the value of any crop produce consumed in the farm hence or supplied to workers for which no payment is made less the value of any produce bought for resale (Gross output as defined here, does not include the product of an enterprise retained for use on the farm).
- Gross output of livestock is total return from livestock and livestock products less purchases of these items plus the value of any livestock produce consumed in the farm house or supplied to workers for which no payment is made. Gross output includes production grants attributable to the enterprise eg. Hill sheep subsidy calf - subsidy.
- Output of a livestock enterprise is its gross output plus the market value of livestock and livestock products transferred to another enterprise (transfer out) plus the market value of my production from the enterprise consumed on farm less the market value of livestock and livestock products transferred from another enterprise (transfers in).
- Output of a cash crop enterprise is the total value of the crop produced, irrespective of its disposal; it equals returns from the crop plus the market value of any part of the crop used on the farm. When this is calculated for the harvest years, as distinct from the accounting year, valuation charges are not relevant and the total yield of the crop is entered at market prices plus deficiency payments.

- Total cost: are total expenditure plus operating valuation of the cost items depreciation on items of capital expenditures including machinery and payment in kind, less closing valuation of the cost items, purchases of livestock, livestock products and any other produce bought for resale, allowance for the private use of vehicles, and value of purchased stores for use in the farm house or sold off the farm. To machinery depreciation should be added any loss made on the sale of machinery; likewise a deduction should be made for profit on sale of machinery. The value of purchased stores sold off the farm should be deducted from the cost of that item. The subsidy on fertilizer and lime should be deducted from the cost of those items.
- Total input: are total costs with the following adjustments made to put all farms on a similar basis for comparative purposes. Add the value of unpaid family labour, including the manual labour of the farmer and his wife; for owner - occupiers an estimated rented value, less any cottage rents received and less an allowance for the rental value of the farm house. Deduct any mortgage payments and any other expenses of owner - occupation, interest payments, cost of paid management and on tenanted farms, a proportion of the rental value of the farm house.

### 3.2.2. Calculating outputs, costs.

Calculating output:

The procedure for calculating gross output and costs is demonstrated by the following examples:

For example, gross output of cattle would be calculated thus:

	₦	₦
Closing valuation of cattle	=	9,020

Sale of cattle	=	773	9,793
Less:			
Opening valuation of cattle	=	7,998	
Purchase of cattle	=	nil	7,998
Gross output of cattle	=		1,795

Similarly, the gross output of cereals would be calculated thus:

Closing valuation		Nil	
Sales	=	8,489	8,489
Less:			
Opening valuation	=	1,833	1,833
Gross output			6,656

**Note:** some items of sale, eg milk and eggs, for which there are normally no valuations or purchases, can be transpired straight from sales to gross output without any adjustments.

### Calculating costs

Some of the items on the expenditure side of the account also have to be modified, to express the true cost of the resource during the year.

For example, if there were stocks of purchased feeding stuffs on hand at the beginning and end of the year, the cost of purchased feeding stuffs would be arrived at as follows.

Expenditure of feeding stuff	2,713
Opening valuation	304
	3,017
Less:	
Closing valuation	340
Cost of feeding stuff	2,677

Many items of expenditure, eg wages and rents for which there are no valuations can be transferred straight from expenditure to costs without adjustments

### 3.3 Calculation of performance measures

When the necessary adjustments have been made to the accounts, a number of simple measures of performance can be calculated. Their purpose is to (a) show what economic success is being achieved by comparing them with farms of a similar type and size in the locality; (b) uncover whatever weaknesses or strengths there maybe in the present organization and management of the farm; and (c) suggest ways in which greater financial success might be achieved. These measures of performance must not be studied in isolation from one another; the emphasis must be on the business as a whole. There are other measures which could be used in addition to those described below. The particular measures chosen will depend to some extent on the farm and type of farming, and the type of local efficiency standards available.

The first stage in the analysis is to compare the farm results with the average costs and output figures, for comparable farms. These are usually available both as averages of all farms and as above average results achieved by the more successful farms in the groups. In order to offset differences in size of farm, these standards are usually expressed on a per acre basis. Before expressing the results on a per acre basis the acreage of the farm taken up by roads, buildings and woodland should be deducted from the farm acreage, and where there is rough grazing land on the farm it should be converted into an 'equivalent acreage'. A common conversion factor is three acres of rough grazing to

one equivalent acre. This acreage is called the adjusted farm acreage. The accounts analysis can then be set out with average and above average results for similar farms shown alongside for comparison. With this overall comparison in mind, it is possible to go through the various aspects of the farm business by considering in turn the following measures of performance.

Management and Investment Income - is the difference cross output and inputs. It represents the reward to management and the return on tenant's capital invested in the farm, whether borrowed or not.

- Net farm Income - Is management and investment income less paid management plus the value of the manual labour of the farmer and his wife. It represents return to the farmer and his wife for their own manual labour and their management and interest on all farming capital, excluding land buildings. If it is assumed that profit maximization is the primary objective of a farmer's operations, then the net farm income is the measure of his success or failure. The income must be considered in relation to the size of the farm, the quality of its land and fiscal equipment, and the amount of capital available. But within these limits, the average net farm income, earned over a number of years, gives a measure of the continuous economic efficiency of the farm.
- Profit or loss is the difference between gross output and costs. It represents the surplus or deficit before inputting any profit accruing from the ownership of the land.
- Return on tenant's capital. A second useful measure of performance is the return on tenant's capital. This is calculated by expressing the

management and investment income as a percentage of tenants capital. It is difficult to measure the total amount of tenant's capital invested in a farm business. A commonly accepted method is to take the average of the opening and closing valuations of machinery, stores (feed, seed, fertilizers etc), crops and livestock. This measure gives a relationship between the level of tenants capital investment and the reward to capital and management. It should be remembered, of course, that the total capital invested is usually greater than the estimate as calculated here. But this calculation is simple and provides useful guide to the return on tenant's capital.

- Gross output per Acre.

Since a high proportion of the farmers costs are fixed, it is important that a sufficiently high level of production should be achieved, in order to obtain an adequate margin overall costs. A useful measure of the level of production, related to type of farm, is the gross output per acre. The gross output of the farm is divided by the farm acreage to obtain the gross output per acre. The gross output of the farm is divided by the farm acreage to obtain the gross output per acre.

- Net output per acre: since not all farms depend to the same extent on purchased feed and seed, a inner reelection of production from the farm itself can be obtained by calculating the net output. The net output per acre is derived by subtracting the value of purchases of seed livestock keeps seeds bulbs cuttings and plants for growing on, from gross output and dividing by the farm acreage. The purchase of feeds and seeds is virtually or the net output per acre is a better measure than gross output per acre of the use being made of the productive capacity of the land actually being farmed.



### 3.4 Factors affecting the level of output

Output is influenced by three factors;

- Intensity of farming
- Yields obtained in individual enterprises
- Prices realized for products sold.

The intensity of the farm system depends upon the proportion of the output enterprises undertaken, for example dairy farms, potatoes and sugar beet have a higher level of output than cereals, beef and sheep. Output is increased as yields and unit prices rise.

An examination of each enterprise using these criteria will show which, if any of them, are responsible for depressing the total output of the farm. By comparing the way the level of output per acre differs from that of the average farm, it will be possible to suggest ways and means of adjusting the farming system to raise the output and improve the net farm income. This might involve reducing the size of a output enterprise; eg. Beef, and increasing the size of a high output enterprise; eg; dairying.

- Stocking density: the stocking density is an important factor in determining the level of output on most farms. Because of the different classes of farm livestock, it is impossible to measure the relative density of stocking on farms, unless they are reduced to a common basis of measurement.
- Grazing livestock units: It is usual to convert all the grazing livestock into livestock units on a conventional basis related, appropriately, to their feed requirement expressed in terms of starch equivalent. The average number of animals on the farm is calculated by recording the number on the farm each month and dividing by 12.

- Adjusted forage Acres: The forage acreage which includes kale, feed roots etc; but not home grown cereals retained for food, should be adjusted in the following ways. By adding the acreage equivalent of keep rented and deducting the acreage equivalent of keep let; deducting the acreage equivalent of occasional fodder and seed sales; adding or deducting the acreage equivalent of changes in the valuation of stocks of home grown fodder (but changes caused by yield variation attributable to weather conditions, the severity or length of the winter, etc., may be ignored); Converting acres of rough grazing to their grassland equivalent. The following adjustments may also be made:
  - Add the acreage equivalent of purchased fodder,
  - Add the acreage equivalent of catch crops and also of grazing from cash crops of hay or herbage feed.
  - Adjusted forage Acres per grazing livestock unit the ratio obtained by relating the number of grazing livestock units (cattle, sheep, horse ) to the adjusted forage acres, indicates whether or not the farm is under stocked in comparison with other farms in the neighbourhood.
  - Feed conversion: Expenditure on concentrated feeding stuffs is the most important single item of cost on many farms and the extravagant use of concentrated feed is a common cause of low profits. In practice it has been shown that many farmers are either unaware that they are over-feeding, or unnecessarily fearful of the effects of reducing the rations of concentrates. In order to relate livestock output to feed costs, the quantity of feed consumed by the different classes of livestock must be known; this involves keeping records.
  - Labour and machinery. Efficiency factors relating to labour and machinery may be calculated and compared with standards, and these

comparisons may indicate when labor and machinery use is excessive but give little indication of why it should be so. The combined labour and machinery costs form the major part of the total costs on many farms and it is essential that output should be high enough in relation to this expenditure.

3.4 Factors affecting the level of output: output is influenced by three factors.

- Intensity of farming;
- Yield obtained in individual enterprises;
- Prices realized for product sold
- The intensity of the farm system depends upon the proportion of high output enterprises undertaken, for example, dairy cows, potatoes and sugar beet have a higher level of output than cereals, beef and sheep. Output is increased as yields and unit prices rise.

An examination of each enterprise using these criteria will show which, if any of them, are responsible for depressing the total output of the farm. By comparing the way the level of output per acre differs from that of the average farm, it will be possible to suggest ways and means of adjusting the farming system to raise the output and improve the net farm income. This might involve reducing the size of a low output enterprise, eg beef, and increasing the size of a high output enterprise, eg dairying.

- Stocking density: The stocking density is an important factor in determining the level of output on most farms. Because of the different classes of farm livestock, it is impossible to measure the relative density of stocking on farms, unless they are reduced to a common basis of measurement.

- Grazing livestock unit: It is usual to convert all the grazing livestock into livestock units on a conventional basis related, approximately to their feed requirements expressed in terms of starch equivalent. The average number of animals on the farm is calculated by recording the number on the farm each month and dividing by 12.
- Adjusted forage Acres per Grazing livestock unit. The ratio obtained by relating the number of grazing livestock units (cattle, sheep, horses) to the adjusted forage acres, indicates whether or not the farm is understructure in comparison with other farms in the neighbourhood.
- Feed conversion. Expenditure on concentrated feeding stuffs is the most important single item of cost on many farms and the extravagant use of concentrated feed is a common cause of low profits. In practice it has been shown that many farmers are either unaware that they are over-feeding or unnecessarily fearful of the effects of reducing the ration of concentration. In order to relate livestock output to feed costs the quantity of feed consumed by the different classes of livestock must be known; this involves keeping records.

3.4.1 Gross - Margin analysis An alternative or complementary approach is to regard the farm business as a group of productive enterprises, each with its own output and direct or variable costs. These enterprises are centered upon the general farm, which provides common services for all the enterprises and the necessary coordination of processes. The main division of costs is, therefore, into variable costs, i.e., those which can be allocated

to an enterprises and which will alter in size as the scale of the enterprise is changed, and those overhead or fixed costs which can not be easily allocated to an enterprise and therefore belong to the farm as a whole.

- Costs: Farm costs may be divided into fixed and variable costs in the following way:

### VARIABLE COSTS

#### Crops

Seed  
Casual labour  
Contract service  
Spray

#### Livestock

Stock purchase  
Concentrates  
Casual labour  
Contract service

#### Fixed costs

Regular labour  
Unallocated casual labour  
Paid management & secretarial  
Machinery repairs and leasing charges  
Fuel and electricity  
Rent and rates  
Depreciation of building and fixtures  
Sundries (water, insurance, office, phone,  
Professional fees, etc.)  
Financing charges.

\*Machinery repairs and fuel are included in fixed costs, because it is too complicated to allocate these to individual enterprises.

#### Output:

In addition to the division of costs, it is necessary to allocate output to the various enterprises. For cash crops, this presents little difficulty, through grain and pulse crops fed on the farm are credited with the sale value of the product for analysis and planning purposes. For example, if barley is grown and some of the production is fed to fattening pigs, the sale value of the fed the pigs would be included in the output of barley and the value of that barley would be regarded as a variable cost to the fattening pig enterprise. In calculating the output of crops, one is concerned with the crop year rather

than the accounting year. In such cases, it is important to relate costs and returns for the same crop, hence the concept of a crop year. The problem can be met best by keeping a separate record of sales for crops at each harvest. Where this is not possible, the best estimate should be made of the value of crops produced during the crop year under review and relate it to the appropriate variable costs. Forage crop has no direct cash value, and hence no direct output, but have only variable costs. Output from livestock presents no problems being a direct calculation from sales corrected for valuation changes or livestock purchases during the period concerned.

### Gross margins

These are calculated for each enterprises by subtracting the variable costs from the relevant output. The result is known as the gross margin and can be expressed on a per acre or per capital basis for analytical purposes or left as the total for the enterprise as a whole. The fixed costs of the farm business are subtracted from the total of the gross margins for all the enterprises to give a profit or loss.

The treatment of forage consuming livestock differs from that of the non-grazing livestock because, in addition to the usual variable costs of feed vet and medicines they must also bear the variable costs of the forage crops they consume. As a result the livestock gross margin can be regarded as the product of the forage acreage. And the value of such gross margins can be expressed on comparable with data for the cash crop acreage.

The diagram below represents this allocation of costs and output, with the resultant gross margins and farm income.

#### Cash crops

Output less variable costs	non-grazing Livestock Output less Variable	Grazing livestock output less variable costs and variable costs of forage crops
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Gross margin

gross Margin

gross margin

Total gross margin  
Less fixed costs

## Profit

Adding together the gross margins for each enterprise gives the gross margin for farm business as a whole. By deducting the total fixed costs from the total gross margins, the profit is obtained.

### RECORDS AND PREPARATION OF GROSS MARGIN DATA

The first step is to record the necessary data to allow for the calculation of the gross margin of each enterprise and the fixed costs of the farm. For cereals and other cash crops the variable costs and outputs for each enterprise on the farm should be recorded on a harvest year basis. Often in a financial year's records, costs and outputs will relate to more than one harvest year. The costs of fertilizers, seeds etc; incurred by crops still in the ground at the end of the financial year should be excluded from the gross margin records, but these costs incurred in the previous financial year which relate to the current harvest year must be included. The quantities fed to livestock and used for seed should also be valued at market price and added to the actual sales of the crop to arrive at the output for the crop year. If the recording year ends before all the crops have been disposed of; the remaining stocks should be valued at market price. However, almost invariably, when these stocks are sold or fed to livestock on the farm their quantity or realization value differs from the year end valuation. This difference between the valuation and realization should be separately shown.

- INTERPRETING THE GROSS MARGIN SUMMARY

Once the gross margins of each enterprise and the fixed costs of the farm have been calculated an examination for the results for the existing organization can be undertaken.

- Cash crops

If the gross margin per acre of a cash crop is low, it will almost always be due either to low yields or low price per unit rather than excessive variable costs, though the level of these should also be checked. Low physical yields will be due to poor day to day management or a technical reason, e.g. poor cultivation, drainage deficient soil, wrong seed or fertilizer low prices will be due to poor marketing grading or wrong variety.

- Livestock

Here, low gross margins can be due not only to low output, the result of yield or price, as above, but also to excessive inputs either high variable costs, especially feeding stuffs, or low stocking density. Low physical yields will again be due to breed or a technical faults, such as incorrect feeding. Low prices may

be due to aiming at the wrong market, poor finishing or lack of selling ability. High variable costs will usually be due to excessive concentrate feedings though more rarely excess costs occur amongst the sundries, especially on the equipment and veterinary side. High feed costs may be due simply to a failure to keep a check upon the rate of feeding, or it may be due to some genetic cause or physical environment.

In grazing livestock enterprises stocking density (ie, adjusted forage acres per grazing livestock units) can be the most important factors low stocking density may be the result of failure to obtain high production from forage crops, lack of capital to stock the land or a low standard of husbandry. It must be bore in mind that concentrate feeding and stocking density are dependant on one another. Care must be taken in interpreting livestock gross margin per acre because of the difficulty in allocating the acreage used to different classes of livestock. The usual method of allocating the acreage of forage is on a livestock unit basis, expressing the results as acres per livestock unit. It may be more advisable to obtain the gross margin without allocating forage costs.

- Once the cause of a low gross margin in any particular enterprise has been fund, the farmer can consider whether it is possible and economic to remedy the fault, in order to bring the level of that enterprise up to the accepted standard.
- Fixed costs:

One further piece of analysis must be carried out to examine the general level of the fixed costs; these are: labour, consisting of paid regular labour and casual labour which can not be allocated to an enterprise; paid management; power and machinery costs; property charges; sundries not appropriate to particular enterprises and financing charges.

#### 4.0 Conclusion

Profit maximization is the cardinal focus of any agric business and this can be realized through effective analysis of farm accounts and records. Thus; adjusting the accounts for inter farm communism and factors affecting the level of outputs need adequate understanding and implementation.

#### 5.0 Summary

In this unit, you have learnt that: farm accounts should be adjusted for interfarm comparison, deeper understanding of input output costs, gross margin costs and performance measures leads to maximum attainment of profits from the farm.

#### 6.0 Tutor-Marked Assignment (TMA).



1. How are account and records adjusted?
2. How are performance measures calculated?
3. What gross margins and fixed costs?
4. Outline and explain three (3) factors affecting the level of output.

#### 7.0 References/further readings

Ministry of Agriculture, fisheries and food (1973). The farm as a business. Introduction to management. London. Her majesty's stationary office.

### Unit 4: RESPONSIBILITIES OF FARM INSTRUCTORS

#### CONTENT:

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main body
  - 3.1 Special instructors
    - 3.1.1. Should special instructors be secured?
  - 3.2 Responsibilities of special instructors
    - 3.2.1 Local supervision
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor - Marked Assignment (TMA)
- 7.0 References/further reading.

#### 1.0 Introduction

Most departments of agriculture are not sufficiently staffed to meet all the needs for adult education in agriculture. One of the best ways of providing an adequate staff for adult courses is to hire additional full time teachers of agriculture. It is probably unwise, however, to have one or more teachers work full time with agriculture courses for adults. All teachers in a department need experience with adults if they are to do their best with students. A variety of teaching responsibilities will also relieve any monotony in teaching (Prupps, 1963)

#### 2.0 Objectives

By the end of this unit, students should be able to:

- Outline some responsibilities of farm instructors.
- Briefly explain characteristics and responsibilities of local supervision.

### 3.0 Main body

#### 3.1 Special instructors

Often a large agriculture programme for young and older adults has to be developed before a community can be combined that it needs additional full time qualified teachers of agriculture. Some departments have been able to develop their full programme by using part time instructors for teaching one or more courses. Farm machinery and tractor mechanics have been used as special instructors of farm machinery courses. Frequently house wives who have had considerable experience in food preservation have been used to teach food processing courses. Successful farmers have frequently taught enterprise courses, such as swine production, and crop corn production.

Many special instructors have not received professional or formal technical training; the effective use of teaching aids and devices, and the organization and conduct of classes. It is the job of the teachers of agriculture, as the local supervisors to provided this assistance (Phipps 1963)

##### 3.1.1. SHOULD SPECIAL INSTRUCGTORS BE SECURED?

Whether special instructors should be secured will depend upon the needs of the community, the number of teachers of agriculture in the department and the time for adult education available to these teachers. In deciding whether to secure special instructors, a department of agriculture should also consider whether money is available for payment of salaries whether sufficient equipment and housing facilities are available, and whether qualified special instructors can be secured.

If a community should indicate a need for an extensive programme of adult course in agriculture, every effort should be made to meet this need. A much more extensive programme of adult education in agriculture is possible when special instructors are used. The use of special instructors makes it possible for teachers of agriculture to supervise a large number of courses and meet more fully the agricultural education needs of the community.

Persons used as special instructors should have (1) successful occupational experience in the area to be taught, (2) community respect, (3) ability to get along well with people (4) ability and willingness to learn from others (5) available time for teaching and (6) appreciation of the importance of adult education in agriculture.

Professional training and teaching experience, in addition to these qualities are especially desirable. Qualified persons living in a community should be employed if possible because they are then available for providing related individual instruction.

### 3.2 RESPONSIBILITIES OF SPECIAL INSTRUCTORS.

The following is a suggested list of the responsibilities of the special instructors in a department (Phipps, 1963).

- Assisting in organizing the courses
- Assisting in recruiting enrollees
- Asking the teachers of agriculture for assistance in planning course materials and in making teaching plans.
- Reporting at once all equipment maintenance needs to the agriculture teachers.
- Seeing that needed instructional supplies are on hand.
- Seeing that sufficient appropriate projects, jobs, and problems are on hand for effective instruction.

- Always meeting the groups when and where scheduled, being on time.
- Keeping equipment in good working condition.
- Becoming acquainted with enrollees and their problems.
- Preparing and using instructional aids such as charts, 2" x 2" slides, exhibits and posters.
- Keeping necessary records
- Formulating and enforcing safety rules.
- Organizing groups so that maximum training can be provided with the equipment and the facilities available
- Doing an effective job of teaching, including a good job of house keeping.
- Providing individual instructions.

### 3.2.1 LOCAL SUPERVISION

A teacher of agriculture should be the local supervisor of the special instructors. A local supervisor should :

- Survey the community and determined with the help of the local advisory council the courses needed
- Arrange for proper facilities
- Locate special instructors
- Assist in planning the content of the courses
- Provide adequate teaching materials, aids and devices.
- Meet with the special instructors frequently and discuss teaching methods, class organization, course content, safety precautions, sanitary measures, and standards of work quality.
- Visit the first meeting of each class and introduce the instructors, explain the purposes of the course, the goals to be attained and he general plans for conducting the meetings

- Visit classes as frequently as possible in order to give the special instructors any help needed.
- See that complete and accurate records are kept, including attendance records and records of accomplishments.
- Visit the last meeting of each class and see that the course is properly closed. Make sure all equipment is checked, reconditioned, and properly safeguarded.
- Make all necessary reports to the state office accurately and promptly.
- Assist the special instructors in developing a publicity programme.

#### 4.0 Conclusion

In vocational agriculture, farm instructor should be the master of the trade in order to avert square peg being fixed in a round hole. This is why identification of requisite responsibilities of farm instructors becomes pertinent. These include; assisting in organizing the course, assisting in recruiting enrollees amongst others.

#### 5.0 Summary

In this unit, you have learnt that; a comprehensive programme in adult education in agriculture is possible when special instructors are used. Their specific responsibilities have been identified to include seeing that needed instructional supplies are on hand; becoming acquainted with enrollees and their problems among others.

#### 6.0 Tutor-Marked Assignment (TMA)

1. Outline and discuss four (4) responsibilities of special instructors.
2. Discuss whether special instructor should be secured.
3. What are the attributes of local supervisor?
4. Who is a farm instructor?

7.0 References/further reading.

Phipps, L.J. (1963). Handbook on Agricultural Education in public schools. Danville illinos. The interstate printers and publishers.

MODULE 3: Developing Agricultural Education Programme.

Unit 1: Why have a council?

1.0 Introduction

2.0 Objectives

3.0 Mainbody

3.1 Uses of an Advisory council

3.2 What a council should not do

4.0 Conclusion

5.0 Summary

6.0 Tutor-marked Assignment

7.0 References/further reading

1.0 Introduction

The successful development of an effective program of agricultural education is facilitated by the use of advisory councils and committees and by the development of written policies. When a school does not have adequate written polices officially adopted by the board of education, an advisory council for the agriculture department may be used to determine the policies needed and to recommend these polices to the board for adoption.

The vocational education amendment of 1976 require that a federally funded programme be served by a local advisory council. Each eligible recipient receiving assistance under this Act to operate vocational education programmes shall establish a local advisory council to provide such agency with advice on current job needs and on the relevancy of courses being offered by such agency in meeting such needs. Such advisory council shall be composed of members of eh general public, especially of representatives of business industry and labor.

A local advisory council should be provided for agricultural education, not because it is required for federal funding for vocational education in agriculture, but because it is essential for the effective operation of the education programme in agriculture. The advisory council has been found to be one of the most effective devices for implementing the principle that those affected by the programme should have a part, directly or indirectly, in formulating the programme. Every teacher can profit from an advisory council through the following ways.

1. Council members understand the programme and support it and the teachers in the community.
2. A council provides considered advice.
3. The advice received from a council usually represents the community.

## 2.0 Objectives

By the end of this unit, students should be able to:

- Know why we should have a council in developing agriculture programme
- Organize a council
- Discuss policy issues in the formulation of council.

## 3.0 Mainbody:

### 3.1 Uses of an advisory council:

The primary functions of an advisory council are (1) the formulation and recommendation of adequate policies for agricultural education, (2) the evaluation of these policies as they are applied, and (3) the recommendation of needed revisions in existing policies. The study of policies is a continuing job for a council and is its most important job.

Another function of an advisory council is helping to plan annual and long-time programs some of a council's activities involved in planning a programme are:

1. Studying the community to determine needs.
2. Evaluating the present programme of the department
3. Studying the need for extending and broadening the department's programme
4. Developing the objectives for the department's programmes.
5. Considering ways of evaluating the objectives suggested.
6. Helping in publicizing the suggested programme for the reaction of the community.
7. Determining national and state standards that should apply locally.

A council may also be used to consider ways and means of implementing the programme it has helped to plan. Some of the activities involved in implementing annual and long-time programme are:

1. Considering the facilities needed to carry on the annual programme and the facilities needed to develop the long - time programme which has been planned.
2. Considering ways of improving the department public relations.
3. Supporting and sponsoring courses for out of school young adults.



4. Supporting and sponsoring adult courses.
5. Advising regarding who should be enrolled in courses.
6. Advising regarding courses that might be taught and the most useful content for these courses.
7. Considering ways of improving supervised learning by doing programme.
8. Advising regarding programmes of work of the future farmer association (FFA) or other school sponsored agricultural organizations.

Another important use of an advisory council is in helping in the evaluation of a departments programme of agricultural education. Some of the councils activities concerning evaluation are:

1. Giving opinions regarding results of specific aspects of the programme.
2. Considering how the various outcomes of the programme might be measured.
3. Considering sources of information regarding the results of various aspects of the programme
4. Assisting in planning devices, such as surveys and records, for evaluating results.
5. Assisting in planning an annual evaluation report.

### 3.2 What a council should not do.

A council is advisory to the teachers, the administrators and the board of education. A teacher should not use it as a pressure group. A council should have complete freedom in making recommendations and the board should welcome these recommendations. A council and board should understand, however, that the board is free to reject recommendations of a council. When recommendations a council are rejected, the council should not attempt to bring pressure on the board by rallying support in the community for its ideas. If a member or members feel so strongly

about a recommendation that they are compelled to pursue the issue further, they should resign from the council. Councils that are adequately educated regarding their function do not become pressure groups.

Councils are advisory groups for an educational programme, and they should not be used as action groups to sponsor non-educational activities, such as swine improvement Association, fire prevention, districts, community fairs, and artificial insemination rings. A council may choose to recognize the need for such action groups and sponsor an educational programme to help the community recognize this need. For example, a council might sponsor an adult course in swine production, and the participants might organize themselves into a swine improvement association for the duration of their educational programme as a means of learning how to operate such an organization. The organization would be limited to members of the course, however, and if the swine improvement association served a purpose in the community, it might continue on its own momentum after the educational programme was conducted without the necessity of sponsorship by the agriculture department or the advisory council.

Studies of activities of advisory councils have located the following undesirable uses of advisory councils which councils themselves were wise enough to reject as being outside their field.

1. Obtaining funds for the junior livestock show at the country fair.
2. Organizing a soil testing service.
3. Reorganizing the school district.
4. Storing bases in part of a proposed shop building.

#### 4.0 Conclusion

The presence of advisory councils and essential committees in the programme of agricultural education is the precursor for sustenance and survival of the programme.

#### 5.0 Summary

In this unit, you have learnt that: the successful development of an effective programme of agricultural education is facilitated by the use of advisory council.

#### 6.0 Tutor-Marked Assignment (TMA)

1. What is an advisory council?
2. What are the uses of advisory council?
3. Outline council's activities involved in planning a programme
4. Discuss some activities involved in implementing annual and long - time programme.

#### 7.0 References/further reading:

Phipps, L. J. (1963). Handbook on Agricultural Education in public schools. Danielle Illinois. The Interstate printer and publishers.

#### Unit 2: How to organize a council

##### 1.0 Introduction

2.0 Objectives; by the end of this unit, students should be able to explain a statement of policy with practical steps

##### 3.0 Mainbody

3.1 Development of a statement of policy

##### 4.0 Conclusion

##### 5.0 Summary

##### 6.0 Tutor-Marked Assignment (TMA)

##### 7.0 References/further reading

## 1.0 Introduction

A teacher of agriculture desiring, an advisory council should first discuss this with the school administrators. The administrators should then discuss the request for an advisory council for agriculture with the board of education. After the board has approved an advisory councils, it may then be asked a statement of policy regarding the organization. Such a statement usually includes the following.

1. The recognition that advisory groups are a part of the machinery of the school.
2. The purpose of the council
3. The duties of the council
4. The channels of communication with the board of education
5. The method of selecting and replacing council members.
6. The terms of council members
7. The method of eliminating inactive members.
8. The officers and internal organization of the council
9. The persons excluded from council membership
10. The method of obtaining representation at council meetings by the board of education and the school administrators.
11. The relationships of the council to the administrators, teachers of agriculture and other teachers.
12. The provision for councils in order areas of the school system.

## 4.0 Conclusion

Before a comprehensive council is organized, the teachers and administrators should understand the by laws and charter of the

council. Often a teacher shows the administrators and the board a policy statement or charter which another school has adopted for its advisory groups. An excellent time to provide administrators and board members with a simple charter for an advisory council for agricultural education is when they are considering the teacher request for the establishment of a council.

#### 5. 0. Summary

In this unit, you have learnt that; a teacher of agriculture desiring an advisory council should first discuss this with the school administrators. You have also learnt about the development of a statement of policy.

#### 6.0 Tutor-Marked Assignment (TMA)

1. what should the teacher of agriculture first do in order to have workable council?
2. What is a statement of policy?
3. What are the attributes of this policy?

#### 7.0 References/further reading

Phipps, L. J. (1963). Handbook on Agricultural Education in public schools. Danielle Illinois. The Interstate printer and publishers.

### Unit 3. Policy making

- 1.0 Introduction
- 2.0 Objectives.
- 3.0 Main body
- 3.1 importance of written policies in agricultural education

- 3.2 Steps taken by Agricultural science teachers in formulating policies.
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment (TMA)
- 7.0 References/further reading

## 1.0 Introduction

Advisory council for agricultural education are almost a prerequisite in most school for the development of sound and effective policies for agricultural education. One of the difficulties in programme planning is the vague or different ideas existing in a community regarding the functions and policies of agricultural education. A policy statement provides the framework for an effective agricultural education programme. A plan may then be developed within this frame work

- 2.0 Objectives by the end of this unit, students should be able to outline and discuss the importance of written policies in agriculture education

## 3.0 Main body

### 3.1 Importance of written policies in agricultural education

Written policies produce many benefits that are directly or indirectly related to a good programme of agricultural education in a school. A statement of policy is valuable for informing new board members of the programme. It also may serve the same purpose for new superintendents, principles, other teachers, and new or additional teachers of agriculture. A policy statement helps prevent misunderstandings and confusion because it indicates objectives, responsibilities and divisions of authority. Policies promote continuity and consistency in the programme of a department, even

when there is a change of teachers or school administrators. Official policies provide a teacher with protection against pressure group and they prevent misunderstandings between the teacher and the administrators of the school.

Policies adopted by school boards are a form of legislation, and they should conform to the standards of well written legislation. policies are not rules and regulations to determine the procedure for accomplishing a specific task. Instead, policies are general principles of operation. A policy is designed to be applicable over a considerable period of time, while a rule or regulation may apply to only one situation or for a short period of time.

It is the legal responsibility of a board of education to establish polices. It can not legally give this responsibility to anyone else. Many schools will never obtain adequate policies for agricultural education if the boards of education must initiate the formulation of the policies needed. Many schools have obtained sound policies for agricultural education by having the advisory councils formulate and recommend policies to their boards of education.

### 3.2 Steps taken by agricultural science teachers in formulating policies

The steps a council and the teachers of agriculture in a school may take in formulating policies for agricultural education might be as follows:

1. Determine federal policies for vocational and non-vocational education in agriculture.
2. Determine state policies for agricultural education and for vocational education in agriculture.

3. Determine existing policies that may be found in board minutes.
4. Analyze existing procedures to determine un written policies.
5. Determine the areas polices should cover and the questions policies should answer.
6. Divide the council into committees to work on policies for certain areas of the agricultural education programme.
7. Have each committee of the council formulated written policies for its areas.
8. Have each committee submit its written policies for approval, revision or rejection by the entire council.
9. Submit the policies formulated by the council to the board of education for adoption, revision or rejection.

The areas which school policies should cover and the questions which school policies should answer have not been definitely determined, but the policies for agricultural education should probably at least answer the following questions:

1. What is agricultural education? What are the purposes of agricultural education programme in the school system?
2. What groups in the community should the agriculture department serve?
3. What geographic territory does the agriculture department provided?
4. What kind of educational services in agriculture will be provided?
5. What are the relationships of the school's department of agriculture to the remainder of he school?
6. How will a programme for agricultural education be planned and who will participate in the planning?



7. How will the various parts of a programme of agricultural education be financed?
8. How will advisory groups be organized and used in the management of the departments of agricultural education?
9. How are the educational outcomes of agricultural education to be determined and who will determine them?
10. What are the admission and retention requirements for students in the various agricultural education courses?
11. What are the minimum and maximum sizes of classes in agriculture?
12. What reports regarding agricultural education will be made to the board of education and to the community? Etc.

Some examples of policies

1. Adult education in agriculture is to be provided.
2. The programme in agricultural education is to be an educational programme.
3. The instruction provided for adults is to be organized and systematic.
4. The regular teacher of agriculture will be employed full time for agricultural education on a 12 - months basis with no more than 1 month of vacation
5. Qualified special teachers are to be employed by the board of education.
6. Mileage expenses will be allowed to teachers for on job instruction. Etc.

Unit 4: National and state standards for vocational education in agriculture

1.0 Introduction

2.0 Objectives

3.0 Mainbody

3.1 Table of contents for the national and state and state standards.

## 3.2 Recommended standards

### 4.0 Conclusion

### 5.0 Summary

### 6.0 Tutor-Marked Assignment (TMA)

### 7.0 References/further reading

## 1.0 Introduction

In the development of policies and a programme for a local department of production agriculture and agribusiness, ideas may be generated by a review of the recommended national and state standards for quality agricultural education programmes. These standards were developed by a large group of the leading vocational education in agriculture professionals in the country. They were validated in the states by teachers, teacher educators and supervisors. They provide suggestions for "benchmarks" for both policies and programme ingredients.

## 2.0 Objectives

By the end of this unit, students should be able to provide comprehensive table of contents for the national and state standards.

## 3.0 Mainbody

### 3.1 Table of contents for the national and state standards for agricultural education programmes

#### 1. Standards common to all programme

- Instructional programme
- Supervised occupational experience
- Leadership development
- Student recruitment, enrollment and consoling
- Public relations
- Facilities and equipment

- Staffing
  - Administration and supervision
  - Finance
  - Placement
  - Evaluation
2. Standards specific to production agriculture

- Instructional programme
- Supervised occupational experience
- Staffing
- Administration and supervision.

### 3.2 Recommended standards

The following are the recommended standards for agricultural education programmes

- The instructional programme contains the necessary balance of class time, laboratory work, field trips and occupational experience to prepare students adequately for employment or advanced educational programmes
- The instructional programmes is reviewed and modified in light of local, state and federal manpower data.
- Supervision of student engaged in cooperative occupational experience programmes is accomplished by both the instructor and the cooperating employer.
- All secondary vocational education in agriculture students participate in future farmer association
- Students enrolled in a specialized programme of vocational education in agriculture have completed a one or two year basic vocational education in agriculture programmes.

- The classrooms, shop and laboratories are adequate for the number of students enrolled. The equipment replicates that found in the occupations for which training is provided.
- The instructor(s) must possess the personal, technical, professional and occupational competencies necessary to prepare students for entry level employment or for advanced educational programmes.
- The instructional programme is supported by an annual board approved budget that considers programme needs and the number of students enrolled.
- The instructor(s), in cooperation with the school counselor(s) will assist in the placement and follow up of students.
- The instructors, local administrators and appropriate state education staff member(s) meet at regular intervals to examine and evaluate formally the vocational education in agriculture programme.

### 3. Standards specific to agricultural supplies and services

- Instructional programmes
- Supervised occupational experience
- Leadership development
- Student recruitment, enrollment and counseling
- Facilities and equipment
- Staff
- Administration and supervision

### 4. Students specific to Agricultural mechanics

- Supervised occupational experience
- Facilities and equipment
- Staffing

## 5. Students specific to ornamental horticulture

- Instructional programme
- Leadership development
- Facilities and equipment
- Staffing etc

## 4.0 Conclusion

Standards are yardsticks for measuring effective performance of teachers, students and the entire programme of agricultural education. The national and state standards in conjunction with the recommended standards are processors to sustainable and enduring agricultural education programme.

## 5.0 Summary

In this unit, you have learnt that: national and state standards with the recommended approved standards are the points for by successful programme of vocational agriculture.

## 6.0 Tutor - Marked Assignment (TMA)

1. What is standard?
2. Outline three national and state standards
3. Outline three recommended approved standards for agricultural education.

## 7.0 Reference/further reading

Phipps, L. J. (1963). Handbook on agricultural education in public schools. Danvilles illinose. The interstate printer and publisher.

## MODULE 4: TEACHING ENVIRONMENTAL AGRICULTURE

### UNIT 1: Understanding the environment.

#### 1.0 Introduction

#### 2.0 Objectives

- 3.0 Mainbody
  - 3.1 Basic concepts and principles
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment (TMA)
- 7.0 References/further reading
- 1.0 Introduction

Man, like all other living creatures has always and will always depend on nature or, the human environment. By this term is meant the totality of physical, chemical and biological conditions surrounding man (Osinem, 2005). Agriculture is the activity most essential for human survival. It feeds people, produces basic commodities for society, and provides gainful employment for the majority.

Agricultural education encompasses many levels (field, technical, intermediate and higher) and can be formal or informal included within the scope are teaching, research and public service outreach programmes in so far as they encompass environmental concern, sustainable agricultural production and rural development. Agricultural education in recent times, has taken on stronger informal roles whereby professional staff act in a developmental capacity, assisting land users in achieving their own objectives and learning from farmers own experience. Agricultural education is therefore, a means of achieving sustainable development concept to various participant groups in society: planners, professional, academics, project workers, farmers, urban dwellers, women and youths (Osinem, 2005)

## 2.0 Objectives

By the end of this unit, you should be able to define environmental education concept and its usefulness.

## 3.0 Mainbody

### 3.1 Basic concepts and principles

Environmental education includes those elements of teaching, research and public services, which address environmental concerns as they affect sustainable development in agriculture, and the management of natural resources. Environmental education could be seen from two perspectives; that leading to special competence and qualifications in areas of environmental science, technology and management or that of creating environmental consciousness through the institutions curricular and operations of teaching, research and public service. According to FAO (1994), both kinds are needed to sustain agricultural development upon which human well being depends.

Therefore, reaching the youths, adults and farmers with an introduction to environmental issues in agricultural context is very vital (Osinem, 2005). Specifically, in serving the informational needs of agricultural teachers, environmental education wills (a) provide teachers with relevant examples and information to familiarize learners with local resources and environment they live in; (b) provides teachers with the opportunity to incorporate environmental issues into their every day teaching; (c) enables teachers use their immediate environment as a tool through which

they can teach their curriculum, benefiting both learners and the land.

On the part of students, through appropriate instructional approaches, the objectives include:

1. To help agricultural students become aware of the seriousness of the ecological degradation of the environment and how man's agricultural activities contribute to these processes.
2. To get young adults and future leaders well informed about environmental problems.
3. To equip them with relevant skills and attitudes that will make them act more positively towards environment.
4. To raise the aesthetic feeling of students.
5. To provide opportunities for students to participate in (agricultural) activities which are manifestations of an environmentally aware citizens.

#### 4.0 Conclusion

From the definition of environment, man is part of the biosphere (the living layer on earth) surrounded by the lithosphere (the physical, chemical and mineral constituents of the environment). In relation to other components of the earth, man is an ecological factor of prime importance, through his adaptability and intelligence. Relationships in nature, are essentially of trophic kind, linking together the soil, the atmosphere and living organisms whereby solar energy is utilized and the organic matter produced passed from stage to stage. When man appeared and grew in number (Osinem, 2005). Man integration with the entire environment for harmonious existence leads to environmental education and management.



## 5.0 Summary

In this unit, you have learnt that: interaction of men with environment leads to environmental education, you have also learnt the concept of environmental education and agriculture and the objectives of environmental education.

## 6.0 Tutor-Marked Assignment (TMA)

1. State and explain 3 objectives of environmental education.
2. Define environmental education
3. Define agricultural education
4. What is lithosphere?

## 7.0 References/further reading

Osinem, E. C. (2005). Environmental Education in Agriculture. Enugu. Cheston publishers.

## Unit 2: Agro-Ecological problems in Nigeria

### 1.0 Introduction

### 2.0 Objectives

### 3.0 Main body

#### 3.1 Meaning of Ecology

#### 3.2 Meaning of Ecosystem

3.3 Explanation of how the effect of any component can be a stress on the entire Ecosystem.

### 4.0 Conclusion

### 5.0 Summary

### 6.0 Tutor-Marked Assignment (TMA)

### 7.0 Reference/further reading

## 1.0 Introduction

Nigeria is covered with a lot of agro-ecological problems ranging from land degradation to evaporation of micro and macro nutrients from the soil. When this happens, our plants suffer and human existence on the planet earth becomes difficult and competing. For harmonious existence on the planet earth, agro-ecological problems must be adequately addressed.

## 2.0 Objectives

By the end of this unit, you should be able state the meaning of ecology and ecosystem, and the explanation of how the effect of any component can be a stress on the entire ecosystem.

## 3.0 Mainbody

### 3.1 Meaning of Ecology:

Ecology refers to the study of the relationship between the living world including man and his environment. It is a field of study concerned with the relationship between the environment and living organisms (Knight, 1985). Infact, any facet of ecology involves a reciprocal relationship between an organism and its environment. For instance, a palm tree in its natural forest setting interacts with certain abiotic and biotic factors. Such abiotic factors include soil water, wind, soil minerals, the amount of sunlight, the prevailing temperatures and other biotic factors (is the non - living elements of the environment). For the biotic factors (the living elements of the environment), they include bark beetle, birds, squirrels, soil bacteria and fungi, worms and parasites of various kinds all of which may directly or indirectly affect the tree and its life. Usually ecology is concerned to a great extent with the habitat and is consequently referred to as "habitat biology" (Osinem, 2005).

### 3.2 Meaning of Ecosystem.

Several relationships exist between organisms in an environment. One of the simplest is the food chain. Plants (producers) in the habitat will be eaten by animals (herbivorous consumers) and they will in turn be eaten by other animals (carnivorous consumers). In this way their lives are connected like a chain. This relationship affects the number of organisms at each level. There will be a large number of plants (or a smaller number of larger plants) compared with the herbivores and in turn, these will tend to exceed the carnivores in number.

Through food webs, the substances of organisms and energy flows from one location to another. They may also be some examples of other relationship between organism such as those of parasitism (one organism living and depending on another) and symbiosis (when two organisms live closely together to the advantage of each other). Organisms also have close relationship through their interaction with th physical environment. Plants for instance, replenish the air with oxygen through photosynthesis, which is used, by animals in respiration. From respiration comes carbon iv oxide that plants can use for photosynthesis. There are many examples of such cycles in a habitat. They are the means by which chemical substances move from one location to another. All these relationships put together in a habitat make up an ecosystem.

The ecosystem is the whole complex of physical factors forming the environment. Any system composed of physical, chemical and biological process active within any space - time unit. It is a functional system that includes an assemblage of interacting

organisms(plants, animals, saprobes) and their environment that act on them and on which they act (Kimmins, 1987).

Therefore, an ecosystem is any unit that includes all the organisms (ie the community) in a given area interacting with the physical environment so that a flow of energy Leads to a clearly defined trophic structure, biotic diversity and material cycles. Also an ecosystem is an assemblage of plants, animals and microbe species in a particular place, which interact with each other and with their physical and chemical environment in such a way as to constitute a self-maintaining and self - regulating system (Slingsby, 1986) .

An ecosystem does not remain static. A piece of waste land colonized by a few plants and animals will be found to change over time. More complex communities containing usually some larger plants and animals will follow communities of small organisms. Eventually by the process of succession an ecosystem will be established which will be in equilibrium. This will contain the climax community, which will tend to remain the same unless major changes in the environment upset it. Then the process of succession will commence again but possibly, in a different form (UNESCO, 1988)

### 3.3 Explanation of how effect of any components can be a stress on the entire ecosystem.

In a biotic community, animals live in association with one another in addition to plants. This is so because animals, unlike plants, are unable to manufacture their own food and ultimately depend on plants for food, either directly or indirectly. In this effect, every change or situation that affects the plants can be a stress on the animals in the ecosystem.

Also, when there is problem in the biotic environment or atmosphere or climate, it affects the ecosystem because plants make use of the energy from the sun and inorganic materials such as water, carbon-dioxide, mineral salts to manufacture carbohydrates and other organic components. Plants are therefore, able to build up organic materials such as protoplasm, produce new cells, grow and multiply and become food for herbivorous animals which themselves become food for other carnivorous and omnivorous animals.

Effect on land and water can result from pollution. Among well-known examples, are marine oil pollution, which arises when oil released from ship and other sources forms a layer over water that prevents the exchange of gases between the water and the air on which the ecosystem depends, and kills sea birds by so doing, the form of the ecosystem will certainly be changed and sometimes plants and animal components are destroyed (UNESCO, 1988).

#### 4.0 Conclusion

The ecosystem is made up of biotic and abiotic subcomponents. At the very least, a terrestrial ecosystem must have green plants, a substrate, and an atmosphere and in most ecosystems, there must be an appropriate mixture of plants, animals and microbes if the ecosystems normally consist of a complex biotic community, together with soil and atmosphere, a source of energy. In conclusion, the ecosystem has the following components; abiotic; autotrophic, heterotrophic and decomposers.

## 5.0 Summary

In this unit, you have learnt about the meaning of ecology, meaning of ecosystem, explanation of how the effect of any component can be a stress on the entire ecosystem. You have equally learnt that the ecosystem has four components.

## 6.0 Tutor - Marked - Assignment (TMA)

1. What is Ecology?
2. What is Ecosystem?
3. Outline four components of Ecosystem.
4. What is the effect of the outlined components on Ecosystem?

## 7.0 Reference/further reading

Kimmins, J. P. (1987). Forest Ecology. New York. Macmillan publishers.

Knight, C.B. (1985). Basic concept of Ecology. New York. The Macmillan publishers.

Osinem, E.C. (2005). Environmental Education in Agriculture. Enugu. Chestra Publishers.

Slingclay, D. (1986). Practical Ecology. Hong Kong. Macmillan press.

UNESCO, (1988). Field work in Ecology for secondary schools in tropical countries. Peru document series No. 30.

## Unit 3:Eco-Protection, Conservation and Management.

1.0 Introduction

2.0 Objectives

3.0 Main body

3.1 Global Environmentalism

3.2 Types of Environmental laws

3.3 Principles of Environmental laws

4.0 Conclusion

5.0 Summary

6.0 Tutor-Marked - Assignment (TMA)

7.0 Reference/further reading

## 1.0 Introduction

Although, there is no single formal definition of environmental law, the general understanding is that its concern is the impact of human activity on natural communities. It could be seen as law set to enforce scientific standard for human health and enjoyment by requesting the correct use of air, water and land. This law has broader application that requires complex policy judgment. Generally, environmental law describes a series of legal strategies and procedures designed to combat the pollution abuse and neglect of air, water and earth resources and upon spaces.

Osinem and Salawu (2001) describe environmental law as a set of international treaties and protocols, national legislations and recommended environmental practices and standards. Eco- protection, conservation and management are devices toward ensuring long usage of land for human existence.

## 2.0 Objectives

By the end of this unit, you should be able to understand environmental laws and their benefits to usage.

## 3.0 Main body

### 3.1 Global Environmentalism.

Environmentalism refers to the political and ethical movement that seeks to improve and protect the quality of natural environment through changes to environmentally harmful human activities; through the adoption of forms of political, economic and social organization that are thought to be necessary for, or at least

conducive to, the benign treatment of the environment by humans and through a reassessment of humanity's relationship with nature.

Historically, national governments have passed occasional laws to protect human health from environmental contamination. For example, in about 80 AD, the Senate of Rome passed legislation to protect the city's supply of clean water for drinking and bathing.

In the 1980s, the trans-boundary effects of environmental pollution in individual countries spurred negotiations on several international conventions. The effects of the 1986 accident at the nuclear power plant at Chernobyl in Ukraine were especially significant. European countries in the pollution's downwind path were compelled to adopt measures to restrict their populations' consumption of water, milk, meat and vegetables.

Environmental laws exist at many levels and is only partly constituted by international declarations, conventions and treaties. The bulk of environmental law is statutory and regulatory. In addition, many countries have included some right to environmental quality in their national constitutions. Since 1994 for instance, environmental protection has been enshrined in the German Grundgesetz (Basic Law), which now states that the government must protect for "future generations the natural foundations of life" In the same vein, the Chinese constitution guarantees to each citizen a right to life and health and requires the state to ensure the rational use of natural resources and protection of rare



animals and plants; The South African constitution recognizes a right to an environment that is not harmful to health, and well being and to have the environment protected for the benefit of present and future generations.

Much environmental law also is embodied in the decision of international, national and local courts. Some of it is manifested in arbitrated decisions.

### 3.2 Types of Environmental Laws

Environmental laws are diversely categorized. However, Cheaver and Campbell - Mohn classified them into four types: command-and-control legislation, environmental assessment mandates, economic incentives and set-aside schemes.

#### (a) Command-and-control legislation:

Most environmental law falls into this category. Such laws typically involve three elements;

- (i) Identification of a type of environmentally harmful activity.
- (ii) Imposition of specific conditions or standards on that activity, and
- (iii) Prohibition of forms of the activity that fails to comply with the imposed conditions or standards. Almost all environmental laws comply with stated conditions or standards. Many make intentional violation of such standards a crime.

Common forms of regulated activity involve actual discharges of pollutants into the environment. Environmental laws generally establish management practices to reduce that risk.

Imposed standards on actual discharge may come in two forms:

(I) Environmental - quality or content standards which fix the maximum amount of the regulated pollutant or pollutants tolerated in the receiving body of air or water and (2) emission or discharge standards which regulate the amount of pollution(s) that any source may discharge into the environment. Most comprehensive environmental laws impose both environmental quality and discharge standards and endeavour to co-ordinate their use to achieve a stated environmental quality goal. Environmental quality goal can be either numerical or narrative. Numerical targets set a specific allowable quantity of pollutants. For instance, 5 micro-grams of carbon monoxide per cubic metre of air measured over four - hour period. Narrative standards require that the receiving body of air or water be suitable for a specific use like swimming.

#### B. Environmental Mandates

This is another important form of environmental law such mandates generally perform three functions:

- (i) Identification of a level of or threshold of potential environmental impact at which contemplated action is significant enough to require the preparation of an assessment;
- (ii) Establishment of specific goals for the assessment mandated and
- (iii) Setting of requirements to ensure that the assessment will be considered in determining whether to proceed with the action as originally contemplated or to pursue an alternative action

Unlike the command - and - control regulations, which may directly limit discharge into the environment, mandated environmental assessments protect the environment indirectly by increasing the

quantity and quality of publicly available information on the environmental consequences of contemplated actions. This information potential, improves the decision - making of government officials and increase the public involvement in the creation of environmental policy. This is because such assessment must describe and evaluate the direct and indirect effects of the project on humans, fauna, flora, soil, water, air, climate and landscape and the interaction between them. This type of environmental law has popularized Environmental Impact assessment (EIA) concept in many actions of the world.

(C) Economic Incentives

Creating incentives for environmental protection using economic instruments is a popular form of environmental law . such incentives include pollution taxes, subsidies for clean technologies and practices and the creation of markets in either environmental protection or pollution.

(D) Set - aside schemes

The last method of environmental protection is the setting aside of lands and waters in their natural state. Europe has an extensive network of national parks and pressure on both public and private lands. In the United States , the vast majority of the land owned by the federal government is managed with environmental protection in mind. There are extensive national parks in Southern and Eastern Africa in which wildlife is protected. Ghana has about 18 sites of wildlife reserves designated either as national parks, resources, wildlife sanctuaries or nature reserve. It can be argued that the large body of law that regulates use of public lands and publicly

held resources is "environmental law". Some people however, maintained that it is not (Osinem, 2005).

### 3.3 Principles of Environmental Laws

A set of principles and concepts outlined in the earth Summit's Rio declaration (1992) have been vital in the design and application of modern environmental laws. Principles such as precautionary, prevention, polluter - pays, integration, pulci - participation and sustainable development are dismissed burly in this context.

#### (a) The Precautionary Principle

Environmental law often operates in areas complicated by high level of scientific uncertainty. In the instance of activities that entail some change to the environment. It is impossible to determine precisely what affects the activity will have on the quality of the environment or on human health. Ordinarily, it is not possible to know whether a certain level of air pollution will result in an increase in mortality from respiratory decrease whether a certain level of water pollution will reduce a healthy fish population, or oil development in an environmentally sensitive areas will really disturb the native wildlife.

The precautionary principles requires that, if there strong suspicion that a certain activity may have environmentally harmful consequences, it is better to control that activity now rather than to wait for incontrollable scientific evidence. This principle is expressed in the R10 declaration, which stipulates that where there are "threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation (Osinem, 2005).

#### (b) The Preventive Principle

In as much as environmental legislative is drafted in response to catastrophes, preventing environmental harm is cheaper, easier and less environmental dangerous than reaching to environmental harm that has already taken place. The principle was the foundation of the basal convention on the control of Trans - boundary Movements of hazardous Wastes and their disposal (1989), which sought to minimize the production of hazardous waste and to combat illegal dumping.

(C) The Polluter - Pays Principal

From early 1970s, the polluter-pays principle has been a dominant concept in environmental law. Many economists claim that producers who "externalize" the costs of their activities cause much environmental harm. For instance, factories that emit unfiltered exhaust into the atmosphere or discharge untreated chemicals into a river pay little to dispose of their waste. Instead the cost of waste disposal in form of pollution is borne by the entire community. Therefore, the purpose of many environmental regulations is to force polluters to bear the real costs of their pollution, though such costs are often difficult to calculate precisely. In theory, such measures encourage producers of pollution to make cleaner producers or to use cleaner technologies (Osinem, 2005).

(d) The Integration Principles

Environmental protection requires that due consideration be given to the potential consequences of environmental fateful decisions. Various jurisdictions and business organizations have integrated environmental considerations into their decision-making processes, through both environmental impact-assessment mandates and other provisions.

(e) **The public participation principle**

Major decisions of environmental protection often require the integration of public views. In most cases, government decisions to set environmental standards for specific types of pollution, to permit significant environmentally damaging activities, or to preserve significant resources are made only after impending decision has been formerly and publicly announced and the public has been given the opportunity to influence the decision through written comments or hearings. In many countries citizens may challenge government decisions affecting the environment in court or before administrative bodies.

These citizen law suits have become an important component of environmental decision-making or both the national and the international level (Osinem, 2005).

(f) **Sustainable Development Principle**

Sustainable development is an approach to economic planning that attempts to foster economic growth while preserving the quality of the environment for future generations. Despite its enormous popularity in the last two decades of the 20<sup>th</sup> century, the concept of sustainable development proved difficult to apply in many cases.

One of the most important area of the law of sustainable development is ecotolism. Although tourism poses the threat of environmental harm from pollution and the overuse of natural resources, it also can create economic incentives for the preservation of the environment in developing countries and increase awareness of unique and fragile ecosystems throughout the world (Osinem, 2005).

#### **4.0 Conclusion**

Environmental law has developed from a modest adjunct of the law of public-health regulations during the late 20<sup>th</sup> century into an almost universally recognized independent field protecting both human health and non-human nature.

#### **5.0 Summary**

In this unit, you have learnt the following: global environmentalism, types of environmental laws and principles of environmental laws.

#### **6.0 Tutor-Marked Assignment (TMA)**

1. List 3 principles of environmental law
2. Define global environmentalism
3. Who benefits from environmental laws?

#### **7.0 References/further reading**

Osinem, E.C (2005) Environmental Education in Agriculture. Enugu Cheston Publishers.

Osinem, E. C. & Salawu, I. A. (2001). Nigerian conservation foundation (NCF) - state collaboration, capacity Building and Performance in Environmental Interventions - A Revised final Research Report submitted to centre for Research and Documentation CRD, Kano.

Agro-forestry offers more realistic alternatives as the use of Nitrogen-fixing trees species can help to maintain and even enhance soil fertility. Sola (1993) stated that by integrating trees/shrubs with arable crops and/or animals on the same piece of land in space and time, gives rise to the following components which positively interact both economically and ecologically.

(i)Agrosilvipasture - growing of arable food crops, trees/shrubs and livestock pasture.

(ii)Agrosilviculture - growing of arable crops and trees/shrubs

(iii) Silipasture - combining tree/shrub crops with livestock pasture.

Msham (1993) recommended that multipurpose tree and shrub species should have the following properties:

(a) Fast - growth and high biomass production

(b) Nitrogen - fixing as well as ease of propagation and management.

(c) Deep rooting system

(d) Multiple products (fuel, food fodder, fruits and medicinal)

The summary of benefits of trees and various forms of Agro-forestry combinations (UNEP, 1991) is presented below:

- (i) Provision of subsistence needs such as fuel wood, charcoal, building materials, fodder, fruits nuts, honey, medicines and dyes.
- (ii) Environmental uses - prevention of soil erosion, watershed protection, maintenance of soil fertility, shade, shelter from wind, prevention of flood, landslides and water retention.
- (iii) Industrial uses - poles, plywood, veneers, papers and boards, gums and resins, oil and exports materials.
- (iv) Genetic store house from which strains for crops medicine and industrial chemicals are derived.

#### **Making ditches and channels to divert Run-off**

- \* materials
- \* methods
- \* timing

#### **Grassing water-ways and outlets**

- \* materials
- \* methods
- \* timing



#### **4.0 Conclusion**

Conservation would be achieved by improving positive attitudes in the system, and the choice of methods employed; and as a matter of necessity, introducing innovations, which would promote and sustain high levels of land productivity.

#### **5.0 Summary**

In this units you have learnt the following: choice of soil conservation methods and devices encompassing - organic maturing and crop residue management; cover cropping; mulching; application of chemical nutrients; tree planting/agro-forestry; making ditches and channels to divert runoff; grassing water-ways and outlets.

#### **6.0 Tutor-marked Assignment (TMA)**

1. State five (5) principles applicable for the best use of soil and water.
2. What factors will you consider to ensure correct choice of soil conservation technologies for a particular soil?
3. with example, write briefly on materials, methods and timing aspects of at least 4 soil conservation technologies.

#### **7.0 References/further Reading**

- (1) Allen, S. W. and Leonard, J. W. (1966). *Conserving Natural Resources*. Newyork. McGraw-Hill Book company.
- (2) Mshan, H. s. (1993). Integrating conservation into farming system: Agro forestry: a potential option. *SPLASH*. 9 (1)
- (3) Osinem, E. C. (2005). *Environmental Education in Agriculture*. Enugu. Cheston Publishers
- (4) Person, R. L. (1964). *Conserving American Resources* (2<sup>nd</sup> ed). London. Prentice Hall, Inc.