PRACTICAL ARTS

GENERAL AGRICULTURE

SECONDARY SCHOOLS

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GENERAL AGRICULTURE

FOR SECONDARY SCHOOLS

IOWA SECONDARY SCHOOL
COOPERATIVE CURRICULUM
PROGRAM
VOLUME VI

ISSUED BY THE
DEPARTMENT OF
PUBLIC INSTRUCTION
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DES MOINES, IOWA

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INTRODUCTION

Some General Considerations

In May, 1944, the Agricultural Experiment Station at Iowa State College published Research Bulletin 327, entitled, "General Agriculture in the High Schools of Iowa," by J. A. Starrack and Max W. Kneedy. The authors of this bulletin were not primarily setting forth the issues in general agriculture instruction, but they did unearth several recommendations which the committee thought might well be repeated here. They are as follows:

"Among the recommendations for the improvement of the program in general agriculture which were suggested by teachers and superintendents and supported by the findings of this investigation, the following are selected as being most important:

a. The minimum amount of college work in agriculture required of teachers of general agriculture should be greatly increased.
b. The college preparation of teachers of agriculture should contain more economics, particularly agriculture economics, rural sociology, biology, and farm shop than at present.
c. More laboratory and field work should be included in the instruction in general agriculture.
d. There should be less reliance upon a single textbook and more extensive use made of source materials, particularly current material in bulletin and pamphlet form.
e. The course of study should be improved by placing more emphasis upon the agricultural problems and conditions of the state and local community, and the implications of national and international aspects of agriculture for the Iowa farmer.
f. More emphasis should be placed upon the development of appreciations for and interests in agriculture and rural life, and less upon the study of the details of agricultural operations involved in the production of crops and animals."

2. To develop in the students an appreciation of farming as a way of life, and of the farm home as a wholesome and desirable place to live.
3. To inculcate in the students an understanding of the vital role which soil plays in the lives of human beings wherever they live, and farmers in particular.
4. To give the students some knowledge of the art and science of agriculture to the end that those who may later live on farms will be better farmers, and those who dwell in urban centers may have a deeper appreciation of the farmer's work and problems.
5. To prepare pupils to be more understanding and efficient consumers of farm products.
6. To provide a series of stimulating problems for students to solve to the end that they may acquire a respect for the value of scientific knowledge and research in the solution of farm problems.
7. To create in those students with the desired physical, mental, and emotional qualities, a respect for farming as a career which offers worth-while and permanent opportunities to intelligent, well-trained young people.
8. When pedagogically sound, to provide class members with the opportunity to act as a service organization within the school for the aid of out-of-school youth and adults in solving their agriculture problems.
9. To develop a program of cooperation and interest within the community.

UNIT I. WHAT IS AGRICULTURE ABOUT?

INTRODUCTION

Although agriculture is a basic industry, and in Iowa the biggest industry, there are many people who do not realize the extent of agricultural occupations. Boys and girls living in the city do not always realize how dependent they are upon the people who produce and process their organic food.

On the other hand, rural boys and girls do not always understand how important it is to their well-being that city people have the money to buy the products of the farms. The interdependence of rural and urban peoples is better understood than it was a generation ago, but there are still people who think of rural people as "hicks," and city people as "snobs" and "slickers." The only way to eliminate such misunderstandings is to learn more about the other person's way of life.

In this first unit an attempt is made, through a series of problems, to lead the student to read and think about agriculture as a way of life and a means of making a living. The problems also will show that agriculture is an industry so basic to the common welfare of the people that no nation can afford to let anything but the natural elements interrupt the normal production and flow of agricultural products.

Although this course of study provides for a two-week study of Unit I, there is no reason, if the interest of the class warrants, why considerably more time can not be spent on related problems of the economic aspects of farming, and the place of governmental regulations in agriculture. In Unit I, as in the following units, the instructor should feel free at all times to change the problems as printed or add problems to suit the local situation.

GENERAL OBJECTIVES

1. To develop an interest in and a desire to know more about agriculture.
2. To develop an appreciation of agriculture as a way of life.
3. To learn some of the reasons why agriculture is one of man's most important industries.
4. To learn why it is important and necessary that the modern agriculturist obtain as much education as is possible and practicable.

SPECIFIC OBJECTIVES

1. An interest in agriculture.
2. The ideal of understanding what agriculture is about in all its many phases.
3. The ability to gather information about agriculture as an occupation and to make intelligent use of it.

The Ability to Gather Information About Agriculture As an Occupation and Make Intelligent Use of It.

Sub-abilities:

A. The ability to distinguish agricultural occupations from other occupations.
B. The ability to determine why agriculture is a basic industry.
C. The ability to understand how agriculture has contributed to our modern civilization.
D. The ability to understand how completely our nation depends upon agriculture for its well-being.
E. The ability to understand how agriculture has made possible the growth of the earth's human population.
F. The ability to understand the advantages of country living.
G. The ability to understand that farming has developed into a complex industry, requiring highly trained and skilled operators to insure financial success.

Sub-ability (A)—The ability to distinguish agricultural occupations from other occupations.

Principles

1. Agriculture deals with all living and growing things and their products that contribute toward man's food, shelter, and clothing needs.
2. Agriculture also includes the culture of plants and animals for their aesthetic value.
3. Many, although not all, agricultural occupations are carried on out-of-doors.
4. A teacher of agriculture would be considered an agriculturist.
5. Persons who indirectly affect production of agricultural products, such as county agents, seed and fertilizer salesmen, livestock buyers, packing house employees, grain elevator operators, etc., are agriculturists.

Problems

1. Bill Smith was born and reared in a large city and knows nothing about farm life or agriculture. He wants to learn more about them. What activities of mankind are classed as agriculture? Are farming and agriculture the same thing?
2. After learning what agriculture is about, Smith decides to go to college and prepare for a vocation in agriculture. Where would you advise him to go to school, and what phase of agriculture would you advise him to go into for a life's work? Give your reasons.
3. Many people are confused about the vocations included under agriculture. Which of the following are agricultural and which are not agricultural vocations?
(a) animal husbandry, (b) apiarist, (c) horticulturist, (d) astrologist, (e) pomologist, (f) veterinarian, (g) agronomist, (h) county agent, (i) grain elevator operator, (j) entomologist, (k) physicist, (l) meat packer, (m) vocational agriculture teacher, (n) dairy bacteriologist, (o) creamery operator.

Sub-ability (B)—The ability to determine why agriculture is a basic industry.

Principles

1. People cannot exist without food, and in the civilized world, without clothing and shelter.
2. Agriculturists produce the raw materials of commerce; e.g., cotton for textiles, rubber for tires, etc.
3. Agriculturists produce the raw materials for food, shelter, and clothing, as well as for some medicines and drugs.
4. The growth of agriculture made it possible for people to live in towns and large cities without fear of starvation.

Problems

1. Agriculture has been referred to as *the basic industry*. What is a basic industry? Do you think agriculture is such an industry? Why or why not?
2. Before the dawn of history, the cave man and his family had to have food to eat. Would you call his method of securing food agriculture? When did agriculture begin?

Sub-ability (C)—The ability to understand how agriculture has contributed to our modern civilization.

Principles

1. Development of agriculture freed man's time from food-getting activities.
2. As men found more leisure time on their hands, it was possible for inventions to be made, and the arts, sciences, crafts, and professions developed.
3. Tremendous growth of food production per man made possible the great urban centers of populations where very few, if any, raw food materials are produced.
4. The growth of agriculture made possible the rise of the professions and other industries by freeing men from the necessity of spending all their time hunting for food and shelter.

Problems

1. It has been claimed that, but for the rise and growth of agriculture, we would not have our other industries and professions. Could that possibly be true? And if so, how could it be; if not, why not?

Sub-ability (D)—The ability to understand how completely our nation depends upon agriculture for its well-being.

Principles

1. The food we eat is a raw product of agriculture and of no other industry.
2. Without food people die.
3. City populations are almost entirely dependent upon farmers for food.
4. If food production were to stop, people in all other industries would either starve or have to leave their industry to hunt for food.
5. Without modern agricultural methods it is doubtful if this nation could sustain but a fraction of its present population and still maintain the present high state of civilization. (Witness India and China.)
6. Food and also most clothing materials are products of agriculture.
7. Wood for building is an agricultural product.

Problems

1. How seriously, and with what effects, would our agricultural production be affected if farmers were suddenly required to make use of methods practiced 50 years ago?
2. Suppose that a railroad workers' strike stopped all freight transportation by rail into New York City for a period of one month. What might, and probably would, happen to the people of that city? How are people in cities dependent upon agriculture? Are farmers dependent on cities?
3. At various times in the past 15 to 20 years farmers have been urged to go on strike and refuse to sell their products until they get the price for them that they want. Would you be in favor of such a strike? What reasons are there for and against such a strike?
4. There is a move on foot to remove some of the national forests of the west from government control. Why would such a move probably not be advisable? What policies are followed in preserving our national forests?

Sub-ability (E)—The ability to understand how agriculture has made possible the growth of the earth's human population.

Principles

1. The number and longevity of peoples are in direct proportion to the amount and quality of food available.
2. Before agriculture, population was limited by the amount of food that could be secured by hunting and fishing.
3. With increase in leisure time, due to agriculture, time could be devoted to thinking about how man's physical, moral, and spiritual well-being could be improved. Hence, the beginning of religion, medicine, and related professions.

Problems

1. What, if any, relation exists between the nutritional value of foods and the soil from which they come? Is it just an accident, or perhaps a custom, that excellent horses are raised in Kentucky's Blue Grass region, or that prime hogs and beef are raised and fattened in Iowa? Explain.
2. It was the custom among the nomadic Indian tribes of North America to leave the old and feeble men and women to die as the tribe moved from hunting ground to hunting ground. Why was this *custom* not practiced by the Navajos, Pueblos, and other Indian tribes with fixed homes?

3. Although the population of the United States has steadily increased since its founding, the per cent of people engaged in farming has decreased, especially in recent years. How do you account for this decrease? What became of the per cent of people who formerly were farmers?

Sub-ability (F)—The ability to understand the advantages of country living.

Principles

1. The cost of living is cheaper on the farm.
2. The tempo of life in the country is slower, and there is less strain on the nervous system.
3. There is much work out-of-doors to do, and the individual is not kept indoors while working.
4. There is usually a variety of work to do.
5. The farmer works with living and growing things.
6. There is more room for living and recreation at home than in the typical city home.

Problems

1. Every kind of work has its advantages and disadvantages. Draw up a list of the advantages of living and working on the farm, and then compare it with another list of the disadvantages of living and working on the farm. Which seem to you to outweigh the others?
2. It is quite commonly said that it is cheaper to live on the farm than in the city. If that is true, why is it true? Make a list of the common costs of living for city and farm homes and compare them as to total cost.
3. Mike works in a large automobile factory in a very large city. He gets two weeks off every summer with pay. Compare his mode of living with that of Ike, who lives on and operates a medium-sized general farm. Which mode of life would you prefer, and why? Compare a typical work day of Mike's with a typical one of Ike's.

Sub-ability (G)—The ability to understand that farming has developed into a complex industry requiring highly trained and skilled operators to insure financial success.

Principles

1. Continued soil depletion requires a wide knowledge of the use and kinds of fertilizers.

2. The marketing of agricultural products has become a highly complicated process.
3. The almost complete mechanization of the American farm requires that the farmer be a mechanic as well.
4. Few, if any, vocations require as many skills to be developed in one individual as does farming.
5. Farmers compete for their share of the national income with many other and highly trained groups.
6. General farming requires a knowledge of how to breed and grow high-producing plants and animals.
7. Few individually owned businesses require the capital outlay for operation and ownership that is required on the modern average-sized farm.

Problems

1. If it is true that it was easier to get started in farming and make a success of it 50 years ago than now, how can the change be accounted for? What has happened to agriculture within the last 50 years? Why and how have farming and farm life changed in that time?
2. Bill Smith decided to go to college to prepare for work in agriculture. Why should anyone go to college to learn to be a farmer?
3. It has been said that anyone can be a farmer. Is this statement true? Make a list of at least 10 qualities or characteristics which a young man or woman ought to possess in order to make a success of farming and farm life.
4. Is farming an easy vocation to get started in? What problems would a young man have to meet and solve before he could hope to farm for himself successfully, either as a tenant or an owner?

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UNIT II. SOIL AND ITS IMPORTANCE TO MANKIND

FOREWORD

This course of study for soils in General Agriculture was designed to provide the student with a general knowledge of Iowa soils, their origin, importance, classification, management, and conservation. The sub-units are based upon abilities and sub-abilities, and provide enough material to cover about six weeks of work.

The instructor should provide the class with necessary and suitable reference material to teach the course properly. Field trips and other activities properly planned, supervised, and correlated with the units that follow will add much to the value of the course.

GENERAL OBJECTIVES

1. To develop in the student an understanding of the relationship between soil fertility and the health of human beings and animals.
2. To develop an appreciation of the part soil fertility plays in the living standards of human beings on a world and local basis.
3. To understand the part soil fertility has played in the life of great nations in the past.
4. To create an interest in the proper care of soil in order to conserve fertility.
5. To understand the part played by soil conservation in community recreation and worthy use of leisure time.
6. To develop the ability to observe and determine the effects of soil erosion and depletion.
7. To develop in the individual a pride in well-managed soils and proper land use.

SPECIFIC OBJECTIVES

1. An interest in soil and its effect on present and past generations.
2. The ideal of conserving our soil that future generations may enjoy its products.

3. The ability
   (a) To understand the part soil has played in the life of present and past generations. 1 week
   (b) To understand how soils were formed and the various classes under which they fall. 1 week
   (c) To recognize soil depletion and know how to reinstate soil fertility. 5 weeks
   (d) To understand the need for conservation of all natural resources vital to our well-being. 1 week

SUB-UNIT I

The Ability to Understand the Part Soil Has Played in the Life of Present and Past Generations

Sub-abilities

A. Ability to understand why soil is the ultimate source of all wealth.
B. To understand the part played by soil fertility in the wealth and power of a nation.
C. The part played by soil fertility in the standard of living within a community and state.

Principles

1. All community wealth originates from the soil. A bushel of corn grown on the farm changes to community wealth in many ways.
2. The income of the doctor, lawyer, merchant, schoolteacher, and others is quite dependent upon the productive power of the soil in the community.
3. The quality of schools, churches, and other community institutions is directly influenced by soil productivity.
4. The distribution of fertile soil directly influenced the settlement of America.
5. Declining soil fertility has played a great part in the destruction of great nations of the past.
6. Fertile soils have much to do with the rank of America as a world power and the state of Iowa among the 48 states.
7. The health of people in a community, state, and nation is directly tied with soil fertility.
8. The future of our nation will be influenced by the conservation of our soil.

Problems

1. A local man recently made the statement that his salary was stable and could not be affected by the climate such as a farmer's income could be. Do you consider this to be a true statement? Explain fully.
2. Recently the nation underwent a severe depression, at which time many people were out of work. Those working were subjected to very low incomes. Farmers lost their farms to mortgage holders, factory workers were out of employment, etc. How do you account for this condition within our country? Explain fully.
3. Many of you people have fathers who work for salaries in this community. In what way is this money tied up with the farm income of the community?
4. In early history we had many strong governments, such as the Roman Empire, the early Greek City States. In the course of time they have lost their power and declined to a low level. What factors do you think have contributed to this condition?
5. Sometime ago I was talking with a Chinese student in the United States who was studying the methods of producing hybrid corn in order that he might take the information back to China. He stated that the problem of China, at the present, is not one of having a car for each family or a good dress suit for each man. Those things are out of the question. China's main problem is that of producing enough food to keep its people from starving. How do you account for this condition?
6. In future years many of you folks will want to go into business for yourselves. Let's consider that you want to go into business in a town of about 10,000 population. Your choice of town size provides an opportunity for you to go into business in the Ozarks of Missouri at a cost of about $6,000. You can go into the same business in northern Iowa for $9,000. Which of the two locations will you choose? Why?
7. If you were a Swedish immigrant to the United States who wished to enter farming, of the following locations which would you choose and why?

State of New Hampshire
Northern Illinois
State of Oklahoma
State of Iowa

8. If you were choosing a community in which to rear and educate your children, would you choose one in which most of the people were on small incomes to very low wages, or one in which people received moderate wages to large salaries? Give reasons for your statements.
9. Write a description of the type of community in which you would like to make your future home, indicating qualifications as to farming, school, churches, etc.
10. Write a description of the part soil depletion or conservation has played in the destruction or improvement of your local community.

SUB-UNIT II

The Ability to Understand How Soils Were Formed and the Various Classes Under Which They Fall.

Sub-ability (A)—The ability to know the structure of our common soils

Principles

1. Soil is made up of finely broken rock material and organic matter which when mixed together is capable of supporting plant life.
2. The average soil contains about 90 per cent finely ground rock material.
3. A soil consists of top soil and subsoil.
4. A productive power of soil is directly related to the amount of organic matter it contains.

Problems

1. When the country was settled, a cubic foot of prairie soil weighed about 60 pounds. Today it is said that the same soil weighs an average of over 90 pounds per cubic foot. How do you account for this situation?
2. You plan to have a good garden for next year and have the choice of two garden spots.
   (a) The soil analysis shows this soil to contain 90 per cent rock material and 10 per cent organic matter or rotted plant material.

(b) Analysis shows this soil to contain 85 per cent rock material and 15 per cent organic matter.

Considering all other factors to be equal, which of the two soils would make the better garden?

3. Write a description of the type of soil you would consider excellent for a garden, including the percentage of organic matter and rock material it should contain.
4. If the organic matter were low, list the ways in which you could increase it in the soil.

Sub-ability (B)—An understanding of what agencies are important in soil formation.

Principles

1. Soils are forming continually through the action of various agencies, such as wind, water, ice, etc.
2. Soils are made of sand, silt, and clay, which result from the disintegration and breakdown of rock material.
3. When the broken-down rock material remains where it is formed over the parent rock, it is called a *residual soil.*
4. Running water may carry the soil material away to lower levels where in quiet waters it settles out and forms *alluvial soil.*
5. Moving ice and glaciers may transport soil-forming materials, and when they melt they unload their burdens as deposits of *glacial soil.*
6. Wind may carry fine particles of soil and deposit it over large areas, forming deposits of wind-borne soil oftentimes called *loess.*
7. Soils formed at the foot of mountain sides as a result of breakdown of rock material is called *colluvial soil.*

Problems

1. A local family planned to take a trip last year. After much thought they decided that they would see more of the State of Iowa instead of going outside. They started their trip in northwest Iowa where the topography was quite level. They had been accustomed to many lakes and gravel pits. They started southwest on their tour, and by the time they had reached Council Bluffs they noticed large hills of yellow-colored soil. When roads were cut through the hills, the soil would stand vertically. After leaving Council Bluffs they drove through southern Iowa and noticed the

presence of rolling hills with many rather deep valleys. In northeastern Iowa the topography was quite rugged; valleys were cut deep in the countryside with much limestone rock making its appearance along the roadsides. How do you account for the wide variation in soil conditions within the small state of Iowa? Explain fully.

2. Last year our class took a soil auger and went out along the river to check soil types. In digging with the auger we noticed that we first went through a layer of light-colored soil and next through a layer of dark soil. How do you account for this condition?
3. You are a cash grain farmer and would like to buy a farm somewhere in Iowa. Which of the following sections should you consider in buying the farm?
   (a) Glacial deposit soils of north central and northwestern Iowa
   (b) The hilly section of northeast Iowa
   (c) The rolling hills of southern Iowa
   (d) The wind-deposited soils of western Iowa
4. Make a list of the various ways in which soils are formed.
5. Draw a map of the State of Iowa, showing the soil type in each section of the state and the way in which the soil was formed.

Sub-ability (C)—The ability to class our soils according to productivity and type.

Principles

1. Soils are often classed according to texture into such classes as loam, fine sandy loam, clay loam, silt loam, silty clay loam, etc.
2. Soils for crop production are divided according to the following classes:
   (a) Coarse sand—35 per cent or more of fine gravel and coarse sand, and less than 50 per cent fine sand.
   (b) Sand—35 per cent or more of fine gravel, coarse and medium sands, and less than 50 per cent fine sand.
   (c) Fine sand—50 per cent or more of fine sand, and less than 15 per cent silt and clay.
   (d) Very fine sand—50 per cent or more of very fine sand.
   (e) Loamy fine sand—35 per cent or more of fine sand, and 15 to 20 per cent silt clay.

(f) Sand loam—25 or more per cent fine gravel, coarse and medium sands, and less than 35 per cent very fine sand.

(g) Fine sandy loam—50 or more per cent fine sand, or less than 25 per cent fine gravel and coarse and medium sands.

(h) Loam—less than 20 per cent clay, from 30 to 50 per cent silt, and from 30 to 50 per cent sand.

(i) Silt loam—less than 20 per cent clay, 50 or more per cent silt, and less than 50 per cent sand.

(j) Clay loam—from 20 to 50 per cent silt, and from 20 to 50 per cent sand.

(k) Silty clay loam—from 50 to 80 per cent silt, and less than 30 per cent sand.

(l) Clay—30 or more per cent clay, less than 50 per cent silt, and less than 50 per cent sand.

3. Sand soil warms up early in the spring, but lacks in mineral content and water-holding capacity.
4. Clay soils are often called heavy, quite often need drainage, are cold in the spring, but most often produce large crop yields.

Problems

1. Mr. A. has been planting his garden on a very sandy soil near an old gravel pit. He says it warms up early in the spring and produces a quick growth of early vegetables. However, he has trouble with water supply for his late vegetables, such as tomatoes. Each year he is required to haul water during the dry weather in August to keep his plants alive, while his neighbor on heavy soil seems to have no difficulty. How do you account for this condition?
2. If you had your choice of the following soils for a vegetable garden, which would you choose: fine sandy loam, loam, or silty clay loam? Be sure to list the advantages and disadvantages of each soil type.
3. If you own and live on a farm which is comprised largely of sandy soil, which of the following crops are likely to grow to the best advantage on your farm: corn and soybeans, oats, barley, flax, bluegrass and timothy, brome grass, alfalfa and red clover?

4. Make a list of the most common soil types in your community, and list the general characteristics of each one. Include texture, types of crops best suited, etc.

SUB-UNIT III

The Ability to Recognize Soil Depletion and the Interest in and Ability to Reinstate Its Fertility.

Sub-ability (A)—To understand what conditions indicate a depleted rundown soil.

Principles

1. The presence of gullies in hillsides is an indication of a poor cropping program.
2. Corn of yellow color and stunted growth indicates lack of soil fertility.
3. A short thin stand of oats or other small grains on land is an indication of poor fertility.
4. Corn or soybean fields infested with cockleburs and other annual weeds are often an indication of poor soil management.
5. The firing or turning brown of the lower corn leaves in dry weather is quite often plant food starvation.
6. Short thin growth of legumes often indicates lack of lime or phosphate.
7. Clouds of dust blowing from fall plowed fields in the winter and early spring quite often indicate poor crop rotations.

Problems

1. Last summer during the month of August it was quite dry in some parts of the state. Corn leaves were drying up from the bottom, and the stalks were stunted in a field along one side of the road. Across the road was a field of corn on another man's farm which had kept its dark green growth and appeared to have suffered no ill effects from the drouth. To what facts do you attribute this condition?
2. We have in a certain community a farm which is covered with cockleburs. The hillsides have gullies too deep for crossing with a combine, corn yields an average of about 25 bushels per acre, oats 20 to 25 bushels and other crops in the same proportion. The buildings are very run-down. The tenant is very poor and discouraged with his prospects. Indicate all the factors you can think of which may have led to this situation.

3. A local business man had saved enough money last year to buy a 160-acre farm. He had the choice of two farms which he could buy.
   (a) level land, drainage good, fields infested with cocklebburs, corn yielded 40 bushels per acre, no legumes had ever been seeded on the place, buildings run down, soil type was good, but low in fertility.
   (b) rolling land, fields clean and free from serious weeds, all fields laid out on the contour, corn yielded 95 bushels per acre, oat yield was 70 bushels last year, buildings and fences above average, good crop rotation in use, price $160 per acre.

   Which farm do you think is the better buy? Why?
   How much money would it take to bring Farm A to the same fertility level as Farm B?

Sub-ability (B)—The ability to use legumes and crop rotations in restoring fertility.

Principles

1. Legumes add nitrogen and organic matter to soils if properly inoculated.
2. Lime and phosphate often need to be added to secure proper growth of legumes.
3. Alfalfa and sweet clover need lime more than other legumes.
4. Legumes must be properly inoculated before they are capable of taking nitrogen from the air.
5. Plowing under legumes builds up the humus supply and increases the number of bacteria which break down minerals for crops.
6. Proper crop rotations are necessary to maintain fertility and prevent soil erosion.

Problems

1. Mr. A. says he does not believe in the use of clover and alfalfa in the rotation. He practices a simple rotation of corn one year and oats the next. Outline what is likely to happen to Mr. A's crop yields and soil condition.
2. Mr. B. has been trying to grow alfalfa on his farm but is having poor luck. He buys the best northern grown seed, plows the ground in late July, packs it with a cultipacker and seeds it in early August so that it will have no competi-

tion from weeds. Yet each year he does not get a stand. List the points that may be lacking in Mr. B's plan which might have made him more successful with alfalfa.

3. Two local men use the following methods in seeding their red clover each year:
   Mr. A. spreads the seed at rate of 10 pounds per acre with the endgate seeder when he seeds the oats. He disks the clover in when the oats are covered. The seed was inoculated with some left-over bacteria from his soybean inoculation of the previosu year.
   Mr. B. seeds oats first then broadcasts red clover at rate of 7 pounds per acre. Clover seed is covered by use of a cultipacker. Seed was inoculated with red clover bacteria from a local seed store.
   Which man, in your opinion, is likely to get the better stand of red clover? Consider all other factors to be equal.
4. The following rotations are in use in this territory by many of the farmers. If you own an average farm in this community, which rotation do you think to be the better, considering all factors, such as maintenance of soil fertility, weed control, crop yields, large supply of high quality feed, etc.?
   (a) corn, oats, clover
   (b) corn, corn, oats, clover
   (c) corn, corn, oats, alfalfa-brome, alfalfa-brome
   (d) corn, oats and sweet clover, corn, oats, alfalfa-brome, alfalfa-brome
   (e) corn, soybeans, corn, oats, red clover.
5. Mr. H is of the opinion that you should rotate with legumes. He uses soybeans to do this. He combines his beans and sells them at the local elevator. He claims that his corn yields following beans are slightly higher and that they make a nice cash return. His neighbor, Mr. B, says a cash return of that type will not help his soil, but will take more minerals from the soil than he puts back. He rotates with alfalfa. He uses a stand for three years as hay and pasture and then plows it under for corn.
   Which man is doing more to increase soil fertility?
6. Write a plan stating how you would properly seed a field of red clover, indicating choice of seed, inoculation, amount to plant, and seeding methods.

7. Make a good rotation for a 160-acre farm in your community, indicating cropping program each year for the next ten years.
8. Bring to class a sample of soil where you are growing legumes in your garden or some field, and we will go through the test for acidity.

Sub-ability (C)—Ability to use lime, commercial fertilizer, and barnyard manure to increase fertility.

Principles

1. Lime is necessary to correct acidity for growing legumes.
2. The quality of lime is based upon its calcium content and the fineness of grinding.
3. Lime should be placed on the land six months prior to legume seeding.
4. Commercial fertilizers are excellent for increasing soil fertility, but should not replace good rotations and use of manure.
5. If the full value of manure is to be utilized, it must be handled so as to prevent leaching, loss of liquid portion, and loss by evaporation and gases.
6. Commercial fertilizers are usually made up of three elements; nitrogen, phosphorus, and potassium. The numbers of the formula give the per cent available of each nutrient. For example, 10-20-10 would mean 10 per cent available nitrogen, 20 per cent available phosphorus and 10 per cent available potassium.

Problems

1. Mr. A. decided that he needed lime on his soil, since legumes had not been growing very well. With a spade he took samples from all the low spots in the field, being very careful not to dig deeper than four inches in securing his samples. These were taken to the county agent for testing. Would you consider this an accurate test? If not, why? If so, why?
2. Mrs. B. has had trouble with her house plants not blooming during the winter. Her neighbor, Mrs. I, has excellent luck with her plants and suggests that perhaps she needs to add some nitrogen fertilizer. What do you think of this suggestion? Give reasons for your opinion.
3. The following plans have been used by local people in liming their soils:

Mr. A. takes soil tests from high spits in the field.
Applies lime which tests 80 per cent calcium carbonate and costs $4.50 per ton.
Applies lime at the rate of two tons per acre in the fall before seeding legume in spring.
All lime particles pass quarter-inch mesh screen with about 60 per cent being dust.
Mr. B. takes composit sample from high and low spots in field.
Applies lime testing 98 per cent pure calcium, cost $5 per ton.
Applies at rate of one ton per acre on the corn when it is knee high. Field to be planted to oats and alfalfa the next spring.
All particles pass quarter-inch mesh screen with about 70 per cent dust.

Which of the above plans do you consider to be the best job of liming? Why?

4. Mr. A. has some alkali ground which shows a need for potash fertilizer. He can buy one of the following fertilizer:

   0-9-27, 13-39-0, 0-0-60

   Which of the above would you advise that he buy?

5. Mr. A. and Mr. B. use different plans in handling manure on their dairy farms.

   Mr. A. hauls manure to field each day.
   Puts phosphate in the gutters and also straw to preserve liquid manure.
   Applies manure at rate of six tons per acre to ground that will go to corn the next year.
   Mr. B. piles manure in pile during the winter to haul in the spring.
   A drain is provided at end of barn for draining the liquid manure from the gutter.
   Manure piles are tramped with livestock during winter to avoid loss of nutrients.
   Plenty of straw is used for bedding.
   Manure is applied to red clover in the spring at rate of ten tons per acre.

Which of the two men do you consider has the better plan?

6. Outline a successful plan of liming a field for alfalfa.
7. Consider that you need to buy fertilizer for fertilizing corn and oats on your farm. Indicate the analysis you would buy and the amount per acre you would apply.
8. Make a plan for properly handling manure in order to conserve needed plant food.

SUB-UNIT IV

The Understanding of Need for Conservation of All Natural Resources Vital to Our Well-Being.

Sub-ability (A)—Ability to recognize erosion and the ways in which it takes place.

Principles

1. Erosion is recognized by the presence of large gullies, appearance of yellow subsoil on hill sides, short stunted growth of crops and general run-down appearance of farms.
2. Erosion has resulted from greedy and ignorant farming practices of past years.
3. The annual cost of erosion is figured at about $400,000,000 per year.
4. Erosion takes place by action of water and wind.
5. Water erosion is detected by presence of gullies and sheet erosion, while wind erosion is detected by piles of soil along fence rows, roadsides, etc.

Problems

1. When the first settlers arrived in America, they found a land richly endowed by nature. Trees, shrubs, and native grasses covered the total area. Today much of that same land is covered by gullies, eroded hillsides, abandoned farms, and stunted crops. How do you account for this condition of our most important resource, the land? Give definite reasons for your opinion.
2. In the southwestern part of Iowa, a young man of 27 homesteaded a 320-acre farm. He lived on this farm all of his life. When he settled on the farm, a small pond existed in the far corner. He drained it by plowing a furrow for about one-half mile down through a low part of the farm. Years passed and when the man died at the age

of 87 this same furrow was a gully 30 feet wide at the top and 20 feet deep. What factors do you think led to this condition?

3. In driving over the state during the spring, one sees many fields with dust clouds blowing from them. Other plowed fields in the same neighborhood show no blowing. How do you account for this?
4. Outline in detail all the reasons you can think of for the terrible scars of erosion which mar the face of our land in the United States.

Sub-ability (B)—The ability to control erosion.

Principles

1. Erosion can be controlled through the proper use of vegetation on the land.
2. Erosion control is possible through the following practices:
   (a) Terracing of slopes ranging up to five per cent.
   (b) Crop rotation.
   (c) Cover crops for seasonal protection of fields.
   (d) Retirement of seriously eroded land to permanent protection of grass and trees.
   (e) Contour cultivation.
   (f) Planting critically eroded areas to feed and cover plants for rehabilitation of wildlife.
   (g) Control of gullies, chiefly with grass.
   (h) Control of terrace outlets with grass.
   (i) Construction of grassed waterways.
   (j) Pasture improvement through contour plowing and reseeding.
   (k) Arrangement of fields into those adaptable to contour cultivating, stripping, terracing, and other treatment necessary to conserve soil.
   (l) Field stripping to control wind erosion.

Problems

1. Farmer A. has been planting his corn up and down the hill for some time. He complains that he gets a good crop of corn at the foot of the hills, but the hill tops barely produce 25 bushels per acre. How do you account for this condition?

2. A farmer in southern Iowa had a gully about five feet deep through his field. He planted sods of Reed Canary grass in the bottom of the gully and at the end of seven years there was no longer a gully. How do you account for this success in filling the gully?
3. A local farmer has a field which has a ten per cent slope. He has had considerable trouble with erosion on it in the past and would like to use some conservation practices on it. However, he is undecided as to whether he should terrace the field, strip-farm it, or just contour cultivate it. Which of the practices would you recommend? Give reasons for your opinion.
4. Today we will go on a trip and observe some of the soil conservation practices in use around here. We will observe methods by which contour lines are made.
5. If your farm needed a good grassed waterway on it, how would you go about the job of building it? Explain in detail.

Sub-ability (C)—The contribution of well-managed soils to the future of civilization.

Principles

1. Wildlife returns to land properly managed. Grazed woodlands and burned-over pastures offer little to control erosion and no protection to wildlife.
2. Farmlands, woodlots, and streams under proper management offer abundant recreation for farmers and city people alike.

Problems

1. Louis Bromfield, noted author and farmer, moved back to his birthplace in Ohio only to find that in the 30 years of his absence most of the springs on the farm had ceased to flow. After six to seven years of his management the springs again began to flow. How do you account for this situation?
2. Mr. Bromfield likewise noted the absence of quail, rabbits, and other wild game so prevalent when he was a boy. After seven years of his management they again appeared in large numbers. Explain fully how this was accomplished.

3. Imagine you are able to buy one of the most run-down farms in the community. Outline in detail how you would restore this farm to abundant production and living. Your final plan should provide the farmer and his family with not only good crops but a place in which he and his family can enjoy abundant living.

Additional Activities

1. Take a field trip to study soil profiles on virgin soil and nearby eroded field and make miniature profiles to take to classroom.
2. Study airspace in soil by water displacement method.
3. Study size of soil particles by water separation and settling method.
4. Test soils for lime, phosphorus, potassium and nitrogen.
5. Grow plants in laboratory on nutrient solutions (soil-less culture.)
6. Compare rate of water movement-up-down in glass tubes of coarse and fine soils.
7. Field trip to see exposure of soil layers and rock formations; collect and study samples.

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UNIT III. USEFUL FARM CROPS

GENERAL OBJECTIVES

1. To develop an interest in plants and how they grow.
2. To develop an appreciation of some of the problems in raising plants.
3. To develop the ability to understand the importance of plants and their relation to man.
4. To gain an understanding of how plants have been developed and improved.
5. To aid students in recognizing and solving the type of problems with which they will come in contact in later life.

SUB-UNIT I

Corn Production

Specific Objectives

1. To develop an interest in corn production.
2. To develop the ideal of efficient corn production.
3. To develop the ability to understand the principles involved in the efficient and economical production of corn.

Sub-Unit I

The ability to understand how to produce corn efficiently. (4 weeks)

Sub-abilities

A. The ability to prepare a good seed bed.
B. The ability to select the variety and plant corn.
C. The ability to cultivate corn.
D. The ability to harvest and store corn.
E. The ability to control weeds.
F. The ability to control insect pests and disease.
G. The ability to understand hybrid corn production.

Sub-ability (A)—The ability to prepare a good seed bed.

Principles

1. Fall plowing destroys weeds and insures good physical condition of the soil. It may also increase losses from erosion.

2. Plowing should be deep enough to cover trash well and make the use of planter easy.
3. Spring plowing is most practical for the majority of Iowa farms.
4. Seed will not germinate well on cold, wet soils.
5. A good seed bed is free of weeds.
6. Plowing under corn stalks adds valuable organic matter and fertilizer elements to the soil.
7. Weeds are more easily killed before the crop is planted than after.

Inductive Problems.

1. In "Plowman's Folly," the author argues that we should not plow for corn, but should use surface methods of tillage in preparing the seed bed. What can you say in regard to this?
2. Since hybrid corn has been grown, many farmers insist their stalks are so heavy that the only way they can get rid of them is by burning. Do you approve of this? How would you advise a farmer in this situation to handle his stalks?

Judgment Problems.

1. Experiments on corn seed beds prepared by plowing in the ordinary way, by lister preparation, and by various surface tillage methods have often been carried out in Iowa. Under different conditions each has shown certain advantages. How do you account for this, and which would you recommend for your condition?

Creative Problems.

1. Mr. Smith has recently purchased a farm and moved out from the city. He is anxious to produce the best corn possible on this farm, and has asked you for suggestions on how to prepare the seed bed. Outline the steps which you think he should follow.

Sub-ability (B)—The ability to select correct varieties and plant corn.

Principles

1. Hybrid corn is used on practically 100 per cent of Iowa's corn acreage.
2. The production of hybrid seed corn is a highly specialized business for which the average farmer is not adapted.

3. The Iowa Corn Yield Test is a state wide test to determine which hybrids are best adapted to the different sections of the state.
4. There is danger of growing hybrids which will not mature in the desire to secure a higher yield.
5. Drilled corn under average conditions outyields checked corn.
6. Much of our corn should be planted on the contour; this means drilling.
7. Weeds must be killed before the corn is planted if they are to be controlled successfully in drilled corn.
8. Planters should be checked and calibrated carefully before planting starts.
9. Corn should be planted from one to two inches deep.
10. Corn should be planted at the rate of about one bushel to seven acres.
11. Corn borer damage is greatest to corn planted early or late.
12. Planter marks should be covered with the harrow immediately following planting in order to prevent erosion.

Inductive Problems.

1. In 1935 almost all of our corn in Iowa was of the open-pollinated variety. In 1947 it is estimated that over 99 per cent was from hybrid seed. What has brought about this complete change?
2. A corn salesman is stressing the fact that his corn is produced from a single cross. What does he mean by this? Is this as much of an advantage as he claims?
3. Your neighbor has a field of corn which was planted with seed purchased from salesman X. He thinks the cost of hybrid seed is too high, and wants to know why he cannot save seed from this field for next year. What would you tell him in answer to this question?
4. A student from Texas is visiting in Iowa, and is puzzled over the terms of checking and drilling corn. He says the only term he has heard in Texas is listing corn. Explain in terms which he can understand the process of planting corn with a corn planter. How should the corn be prepared for the corn planter? How should you prepare the planter for accurate planting?

5. Mr. Jones had a field of late spring plowing which was cloddy and in poor condition for planting. Instead of waiting for badly needed rain, he planted the corn about four inches deep to reach moisture. Do you think he was wise? Why?

Judgment Problems.

1. The salesmen for Funk, Pfister, DeKalb, and others, are all urging you to buy their seed. Each insists his corn will yield the best. How can you determine which one is correct in so far as your own farm is concerned?
2. During the last year your neighbor secured a larger yield of corn than you, although his soil is not quite so good as yours. He used a variety which was recommended for southern Iowa. Do you think you should change to this variety in order to get the larger yield?
3. Mr. Stone has a 60-acre field which is level and quite weedy. Would you advise him to drill or check his corn?
4. Mr. Jones has a field which is somewhat rolling and which is quite free from weeds. How would you advise him to plant his corn?
5. Round kernels can be bought at a lower price than the flat from the seed companies. Which would you advise a farmer to buy?

Creative Problems.

1. Each year the Iowa corn-yield contest is carried out in order to determine what varieties of corn will yield the best in the different sections of the state. Take the report for last year and list the five highest yielding varieties for your district.
2. Write a brief paper, giving the arguments for and against drilling corn.

Sub-ability (C)—The ability to cultivate corn.

Principles

1. The chief purpose of corn cultivation is to eliminate weeds.
2. Deep cultivation destroys corn roots.
3. Weeds are most easily killed when small.
4. Cultivation may reduce yields in dry seasons.
5. The cheapest and most effective cultivation comes from using such implements as the harrow, weeder, and rotary hoe.

6. With drilled corn the early control of weeds is more important than with checked corn.

Inductive Problems.

1. Mr. Jones makes a practice of cultivating his corn about three or four inches deep the first time over. The following cultivations he makes two inches or less, thus producing a very shallow mulch. What do you think of this practice? Why?
2. Your father has a field of corn which has been practically free of weeds since the second cultivation, but he insists that it be plowed at least three more times before it is laid by. In years past he has had you and your brother drive a horse with a drag attached between the rows to keep the surface well mulched. Do you think that this is a good practice? Why?

Judgment Problems.

1. Your father regularly used cultivator shovels of the V type, while a neighbor used the duck-foot type. On another farm only scraper shovels are used. If you had a choice of only one of these three, which would you take? Give your reasons. Which would be your second choice? Why?
2. We worked out in class yesterday the following possible reasons for corn cultivation: (1) loosen the soil for roots, (2) incorporate organic matter with roots, (3) control weeds, (4) check soil blowing, (5) prevent a crust, (6) retain moisture by mulch, (7) force roots deeper, (8) speed up nitrification, (9) prevent erosion. List these in the order of their importance as you see it and on the basis of 100 per cent give each one a value. Have you in mind the reasons for your placings?

Creative Problem.

1. Make a drawing of a corn plant, showing the extent (depth and width) of its root system at 9, 27, and 60 days. Also show how many roots will be destroyed by a four-inch cultivation.

Sub-ability (D)—The ability to harvest and store corn.

Principles

1. Harvesting corn with hogs saves time and labor.
2. Putting corn in the silo provides more feed than any other method of harvesting. It also is the most expensive method.

3. Mechanical pickers are practical and satisfactory.
4. Cribs wider than eight feet are likely to be lacking in ventilation.
5. Corn dryers are practical in seasons of high moisture corn.
6. When corn does not mature properly in the fall, it is satisfactory to leave it in the field until spring.

Inductive Problems.

1. Mr. James is anxious to harvest his corn, but the test shows that it contains 33 per cent moisture. He decides that, since his crib is only eight feet wide, it will be all right to take a chance on storing it. Do you think the corn is likely to spoil, or do you think he is playing safe? Why?
2. Mr. Lake ran out of crib room but has some oats bins in which he might store the rest of his corn, which contains about 30 per cent moisture. He is careful to lay tile in the corn to secure a good ventilation of air. Do you think the corn is likely to spoil? Give reasons.
3. During a year like 1947 much corn does not mature properly. Mr. Brown has heard that the stalks contain more value than in the usual year under such conditions. He has come to you for advice on putting much of his crop into the silo. What would you advise?

Judgment Problems.

1. Mr. Blake has 90 acres of good corn to harvest. He owns two wagons, a team, and a tractor. He can buy another team and hire a man; he can purchase a picker for his tractor; or he can hire a neighbor to pick the corn at $5.00 per acre. Which would you advise? What things would you consider in arriving at the decision?
2. You have 40 acres of good corn. You have 100 head of spring pigs. A neighbor has suggested that you hog down a portion of the corn rather than to husk it from the stalks. How would you reach a decision?
3. You are faced with the prospect of a soft corn crop. You have 20 dairy cows but no silo. How can you make a temporary silo? Do you think it would be advisable?

Creative Problems.

1. Make a plan, using drawings, to show how you would store corn with 40 per cent moisture to insure thorough ventilation in the crib. Indicate dimensions.

2. Make a plan for ensiling a portion of your corn crop, showing the type of silo you would use, the size of silo, the probable number of acres required to fill it, and the stage at which you would cut the corn.
3. You have 100 head of spring pigs, weighing about 110 pounds. Outline a plan for hogging down corn, giving the size of plot which you would hog down at one time, type of fence to be used, the frequency of changing plots, etc.

Sub-ability (E)—The ability to control weeds.

Principles

1. Young weeds in crop land can be eliminated by thorough cultivation.
2. Mowing weeds prevents seed production and improves the appearance of a farm.
3. Smother crops are good for small patches of noxious weeds.
4. A good crop rotation will help greatly in weed control.
5. Weeds are easier to keep under control on soils which are high in fertility.
6. Summer fallow is an effective means of controlling some weeds.
7. Pulling certain weeds is often advisable.
8. Only clean crop seeds should be used.
9. The use of chemical weed killers is satisfactory and practical.
10. Perennial weeds are more difficult to control than annuals and biennials.

Inductive Problems.

1. Mr. Jones has been trying to get rid of a small patch of Canadian thistles on his farm. About every three weeks during the growing season he mows them close to the ground so they will not produce seed. What success would you expect him to have? Are there other weeds which he can control in the same way?
2. When Mr. Robinson moved on his farm it was badly infested with cockleburs, butterprints, and creeping jenny. Each year he practiced early fall plowing, careful seed-bed preparation, and thorough cultivation, and as a result the butterprint and cockleburs were almost eradicated, while the creeping jenny was worse than before and has spread into new areas. How can you account for this condition?

3. Many home owners have sprayed their lawns with 2-4-D to kill dandelions. Bluegrass is not affected by these sprays, but white clover may be. How do you explain this? What other weeds can one spray effectively with 2-4-D?

Judgment Problems.

1. In some corn ground which you have rented you have some European bindweed, Canada thistle, cockleburs, wild mustard, smartweed, and yellow foxtail. Which ones would you expect to kill when you cultivate the corn? Which ones are not likely to be killed? Why?
2. On a certain farm in your community there are Canada thistle, curled dock, quack grass, perennial sow-thistle, smooth dock, and horse nettle. If all of these plants were prevented from going to seed by continued mowing or some other method, which ones do you think would continue to spread? Why should they do this? Could any of them be killed by the above process?
3. Mr. Smith insists on working his corn ground from two to four times with a harrow or disc before the corn is planted. After the corn is up, he uses a rotary hoe and a weeder, then often does not use a corn cultivator at all and never more than once or twice. Mr. Brown thinks this is a lot of work. He hurries through with his preparation of the seed bed, checks his corn, and plows it from four to five times with the cultivator. Which man would you imagine would have the cleanest corn? Which would have the most work to do in handling the crop?
4. Your seed dealer has been trying to sell you on using 2-4-D to control all of your weeds. Your neighbor used sodium chlorate and altacide in the past, and argues against the use of 2-4-D. Under what conditions would the 2-4-D sprays be best? When will the chemical sprays be most satisfactory?

Creative Problems.

1. Make a list of at least ten ways that weeds may be controlled or eradicated and briefly discuss each.
2. Prepare a chart showing the approximate dates for the first, second, and third chemical treatments for the four worst weeds of your community.

3. Outline a program for spraying with 2-4-D, telling when and how you would spray, and on what weeds you could successfully use 2-4-D sprays.

Sub-ability (F)—The ability to control insect pests and disease.

Principles

1. Insects which eat the foliage of crops can be controlled by using stomach poison sprays and sucking insects by contact sprays.
2. Fall plowing reduces damage done by many kinds of insects.
3. Correct planting dates lessen the injury from certain insects.
4. Clean cultivation and crop rotations lessen insect damage.
5. Dust mulches, plowing furrows around the field, and poison bait will help to hold certain insects in check.
6. Destroying trash, clean plowing, and other good cultural practices will help control certain insects.
7. Spraying and dusting by airplane are practical methods for the control of the corn borer and certain other insects.
8. Seed treatment will aid in the control of certain insects and diseases.

Inductive Problems.

1. Farmers have been told to build a barrier around their fields to stop certain kinds of insects. These barriers are usually made by plowing a furrow around the field, then digging a post hole in the bottom of the furrow every few rods. What is the purpose of this sort of barrier? What sort of insects would be controlled in this manner?
2. Poison bran has been used a great deal in the past, and is now being scattered from planes. What insects are controlled by this, and how effective is it?
3. The European corn borer has become a very common problem. Last summer some dusting of corn with DDT by planes was carried out. What was the object of this dusting, and when should it be done?
4. Farmers are being urged to turn under completely all corn stalks in order to control the corn borer. Why is this so important? What other insects can be controlled in this manner?

5. DDT has been used a great deal to control flies and other household pests. What value has it in controlling crop pests?
6. A neighbor has had serious damage from smut in his corn. It has been worst in a field which has been in corn for six years. Why was this corn so smutty? How can he remedy the condition? How can the smut of oats and barley be controlled?
7. Glen Markham has noticed that the hybrid seed he has been planting has produced sounder corn with less disease than the open-pollinated corn he used to grow. How can you account for this? Is there any way the average farmer can control these diseases? Can scurf and scab in potatoes be controlled?
8. The hybrid seed corn companies all stress the point now that their seed has been treated before it is sold. What is meant by seed treatment? What do they use in treating it? What diseases do they claim to control by seed treatment?

Judgment Problems.

1. Cutworms had bothered Mr. Wilson's corn all through June, but about July 1 the damage stopped and the worms disappeared from around the base of the stalks where they had been working. Jim said that they turned into tumble bugs, and his neighbor said they turned into moths. Which one was right? What life stages do insects pass through? When do they do their worst damage? What connection does this have with their control?
2. Every third year we have a big crop of June bugs or May beetles. On the following year the white grubs do a great deal of damage. A neighbor has noticed this, and wants to know if there is any connection between the two. Can you explain it to him?

Creative Problems.

1. Psychology teaches us that one of the best ways to remember anything is to establish as many connections with it as you can get, to work with it, and to think about it often. We have discussed corn insects, given our opinions, and read about them. Now let us make a chart of the different important insects harmful to field crops. Let us include

on this chart the name of the insect, damage done, part of plant affected, and the methods of control.

2. List the different diseases of farm crops and their control. Make another list of general rules that a farmer might follow in keeping disease damage to crops at a minimum on the farm.
3. Farmers in Iowa have had serious loss to their oats crop by a new disease during the last two years. It has hit the Boone oats especially hard. How would you rank the following suggested treatments?
   (a) Treat the seed with a mercury dust.
   (b) Rotate the crops so that oats are not on the same soil more than once in four years.
   (c) Grow disease resistant varieties.
   (d) Use the formaldehyde treatment.

Sub-ability (G)—The ability to understand hybrid corn production.

Principles

1. Inbreds are produced by using the pollen grains of a plant upon the silks of the same plant.
2. Single crosses are produced by crossing two inbreds.
3. Double crosses are produced by crossing two single crosses.
4. The production of inbreds is a job for the specialized plant breeder.
5. Practically 100 per cent of Iowa's commercial corn acreage is now planted to hybrid corn.
6. Seed cannot be saved from hybrid corn without a resulting decrease in yield.
7. Only corn should be selected which has proved good in tests for a number of years.

Inductive Problems.

1. Mr. Black has been buying his seed corn from a hybrid seed corn company and is well satisfied with the results he is getting. He feels, however, that the corn costs him too much, and that if he could secure two single crossed lines he could produce the seed himself more cheaply. What do you advise? Why?
2. Mr. Moe has a choice of two kinds of hybrids which have not been tested for yields. One is the result of a double cross and the other is the result of a three-way cross. Which one can he expect to yield the better? Why?

3. Crow's hybrid corn company are advertising a single cross. They are making strong claims for its yielding ability. How can a single cross be expected to yield more than a double cross?
4. The five steps which the seed companies follow in the production of hybrid corn are: (1) development of inbred lines, (2) maintaining inbred lines, (3) producing of single cross seed, (4) producing of double cross seed, and (5) selling hybrid seed. If you were a farmer and were interested in securing seed most economically, where in this program would you start? Why?

Creative Problems.

1. You have a very good yielding variety of open-pollinated corn on your farm from which you would like to produce a hybrid variety. Outline the steps which it would be necessary for you to take to do this, starting with producing the inbreds. How long do you think it would take for you to do this?

Additional Activities on Corn

1. Make shelling percentage tests of ear corn samples.
2. Collect ears at early harvest—weigh at 1, 3, 7, 14, 30-day intervals to determine moisture loss.
3. Visit a seed corn processing plant in operation.
4. Make germination tests of seed corn.
5. Collect and identify samples of types of corn.
6. Observe husking and cribbing of corn.

SUB-UNIT II

Small Grain Production

Specific Objectives

1. To develop an interest in small grain production.
2. To develop the ideal of efficient small grain production.
3. To develop the ability to understand the principles involved in the efficient and economical production of small grain.

Sub-Unit II

The ability to understand the production of small grain.

(2 weeks)

Sub-abilities

A. The ability to prepare the seed bed satisfactorily for small grains.

B. The ability to select, treat, and sow the best adapted, highest yielding varieties.
C. The ability to harvest, store, and market.
D. The ability to control insect pests and diseases.

Sub-ability (A)—The ability to prepare a satisfactory seed bed for small grain.

Principles

1. Corn stalks on small grain ground constitute a main source of corn-borer infection.
2. Small grain put on plowed corn stalk land has out-yielded grain sowed on land prepared by disking.
3. The seed bed for fall wheat should be prepared as early as possible.

Inductive Problems.

1. Each year Mr. Doan sows about 55 acres of oats. His farm is high in fertility and he makes it a rule never to sow over eight pecks of seed per acre. Do you think this practice is sound?
2. A neighbor prepares his seed bed for oats by harrowing his corn stalks once, then broadcasts his oats. He insists that oats are cheap, he is very busy at oats seeding time, and that he will get about as good results as if he had done a more careful job. How would you advise this farmer if he asked you how to plant oats? How would you plant barley?
3. It has always been the common practice in Iowa to sow oats on corn stalk ground without plowing the seed bed. Now with the damage done by the corn borer farmers are being urged to plow under all corn stalks. What effect will this have upon the yield of oats? Will the later seeding cause any reduction in yield?
4. Mr. Carter has a grain drill which he uses on his wheat and barley. He wants to know whether it might not pay to drill in his oats also. What can you tell him?
5. Mr. Sloan has been drilling his barley for a number of years. He insists he can cut down on the amount of seed used. What do you think about this idea? Why?
6. A student has noticed an item in the paper which stated that wheat could be sown any time after the 21st of Sep-

tember in his county. He wants to know why it can not be sown before that date. What can you tell him?

Judgment Problems.

1. Mr. Bowman is a farmer in northern Iowa. He makes a practice of having his barley in on ordinary years by April 1st. His neighbor waits until after he seeds his oats and so finishes with the barley between April 15th and 20th. Over a period of years which man is likely to be more successful with his barley? Why do you think so?
2. You have read that drilling oats produces larger yields, but also that oats planted after April 5th will yield less than those planted before that date. You have a drill but will be unable to get into your field until April 10th because of wet weather. You can sow the oats with the endgate seeder immediately. Which will you do? Why?

Creative Problems.

1. Make a chart showing the rate of planting that you would consider best for oats, wheat, and barley if you sowed them broadcast and if you drilled them. Assume that your soil is of average fertility.
2. Assume that you were running a 160-acre farm and have about 40 acres for oats. Outline your course of procedure in sowing this crop, paying attention to time of planting, depth desired, method of planting, rate of planting, and machinery used. Be sure to give reasons for all procedures used.
3. Many farmers feel that oats are not a paying crop. They would like to find a substitute. Make a comparison of the different small grains as to acre yield, cost of growing, price per bushel, and value as a feed, and draw conclusions as to which crop would be the most profitable to grow. Make this in table form.

Sub-ability (B)—The ability to select, treat, and sow the best adapted, highest yielding varieties.

Principles

1. Drilling oats will result in a slightly higher yield than broadcasting, and will save some seed.
2. Oats and barley are commonly sown with an endgate seeder; wheat is usually drilled.

3. Many new and improved varieties of small grain have been developed by the colleges. These are much superior to the old varieties.
4. Only varieties adapted to soil and climate should be used.
5. Oats should be fanned to remove weed seed, light seed, dirt, and chaff.
6. Oat seed should be treated to improve yield.
7. Oats and barley should be covered at a depth of from one to two inches.
8. Oats are sown at the rate of from two to three bushels per acre; barley at the rate of about two bushels per acre; wheat at about six pecks per acre.

Inductive Problems.

1. A farmer tells you that he would like to grow barley, but he remembers the trouble he had as a boy with the barbs on barley heads. What can you tell him about the modern varieties of barley?
2. Mr. Davis has heard of Benton, Boone, Tama, Clinton, and Marion oats. He wants to know about them, and why they have these names. Is that where each should be grown? Or is it where each was developed? What can you tell him about each of these newer oats varieties?

Judgment Problems.

1. For several years Boone oats have been our most popular variety. In 1946 and 1947 heavy losses were suffered all over Iowa because of a new disease which seemed to affect Boone more than any other. The county extension director has recommended that all farmers either treat their Boone seed with one of the mercury dusts or use Marion or Tama instead. Which do you think would be best? Why?
2. Many farmers have paid high prices for Clinton seed oats on the claim that they were resistant to the new oats diseases. Can you find any proof that this is true? What about Benton oats? Colo oats?

Creative Problems.

1. A farmer tells you that he would like to find a variety of oats to replace his Silvermine, which he has been growing for 30 years, but which he thinks has "run out." Make a list of the five or six varieties which you would recommend and state under what conditions he should grow each.

Do you think any of these varieties will outyield his older one? Why?

2. Turkey red wheat has been a standard variety for years. A number of new selections have been developed at various stations in recent years. What ones would you recommend for Iowa? Why?

Sub-ability (C)—The ability to harvest, store, and market.

Principles

1. The combine is gradually replacing the threshing machine as the method of harvesting grain.
2. If grain is cut with a binder it should be carefully shocked.
3. A pick-up attachment on the combine will help a great deal in avoiding bad-weather damage to grain in certain years.
4. Grain should be stored in well-ventilated bins.
5. Usually the market on grain is lower at harvest time than later.

Inductive Problems.

1. Your neighbor has a field of oats which is in the soft-dough stage. The soil is very fertile. He can borrow a binder now and cut them. If he doesn't, he will have to wait about eight days before he can get the binder. He has decided to cut them now. Do you think that he did the wise thing? Why?
2. Your father has only 40 acres of oats to harvest. He has always cut his oats with a binder and left them in the shock not less than two weeks before threshing. Since your old binder is worn out and you don't think it advisable to purchase a new one with the usual small acreage, you try to convince him to let your neighbor come in with his combine and harvest them. He insists if oats are not allowed to go through a sweat in the shock they will spoil. What further information will you give him to change his mind?
3. Mr. Thomas raises about 30 acres of oats each year. He always cuts them a little early and feeds them as hay, rather than to thresh them. He insists this is a much cheaper way to handle the crop and that they make excellent feed. What do you think of this practice?

4. Barley for brewing must be very carefully handled at harvest time in order to produce the quality desired. How would you suggest that the crop be handled here?
5. In Iowa most of our wheat is harvested with combines. Some of the older farmers still insist we should cut it with a binder and thresh it if we are to get good quality wheat. What can you say about this?

Judgment Problems.

1. Mr. Dale has 1,000 bushels of wheat which he would like to store for possible higher prices. He needs the money quite badly, so his neighbor informs him that he may get an A.A.A. loan on it. He is afraid that if he stores it the shrinkage, rodent loss, and interest on the loan will be more than the rise in price that he may get. What would you advise him to do? What advantages can you point out?
2. You have 500 bushels of wheat which was combined and which is badly mixed with weed seeds and small bits of leaves. You can sell it as it is, but the market value will be low; you can feed it to your livestock; or you can clean it and feed the screenings to your livestock. What things will you consider in making this decision? Will you screen it if it contains quite a few small and shriveled kernels?

Creative Problems.

1. Make an outline, listing seven or eight requirements of a good storage building for small grain on the farm. Give good reasons for choosing these items.
2. Make a simple drawing of two types of ventilating devices which you could use in a bin of small grain.

Sub-ability (D)—The ability to control insect pests and diseases.

Principles

1. Seed treatment before planting is effective in controlling small grain diseases.
2. Resistant varieties of oats should be grown where seed can be obtained.
3. Clean cultivation and crop rotations lessen insect damage.
4. Wheat should be sown only after the fly-free date.
5. Stem rust of wheat is best controlled by destroying the common barberry and by using resistant varieties.

6. Stinking smut may be controlled by the mercury dusts.
7. Loose smut is most effectively controlled by using resistant varieties.
8. Ergot in rye is best controlled by rotations.
9. Loose smut in barley and the smuts in oats are controlled by seed treatment with a mercury dust.
10. Barley scab can be partially controlled by seed treatment. Rotation also helps.
11. Rusts and smuts are effectively controlled through the use of resistant varieties.

Inductive Problems.

1. Two years ago we had a crew of men in this neighborhood who were looking for a certain kind of bush. Wherever they found this bush they either dug it out or scattered salt in large quantities around the roots to kill it. They reported they were trying to eliminate some sort of disease of small grains. What disease was this, and what kind of bushes were they? How does such a disease spread, and what damage does it do? Are there other diseases of this sort? If so, what?
2. Quite a number of farmers have been treating their seed oats with mercury dust in recent years. They seem to feel they are getting better yields as a result. What diseases can be controlled by seed treatment? How should these dusts be applied? What grains are most responsive to seed treatment?

Judgment Problems.

1. A farmer near you had considerable loss in oats yield last year due to smut. This coming year he wishes to remedy the situation. His neighbors all have good advice. Some of their advice is as follows:
   a. Rotate and do not have oats on the land more than once in four years.
   b. Treat seed with formaldehyde.
   c. Use the hot water treatment on seed.
   d. Treat seed with a mercury dust.
   e. Buy clean seed.

   How would you rank these different plans for effectiveness in getting rid of the disease?

Creative Problem.

1. List the different diseases of farm crops and their control. Make up another list of general rules that a farmer might follow in keeping disease damage to crops at a minimum on the farm.

Additional Activities

1. Visit an elevator to observe moisture and weight per bushel tests, dockage, and market grading.
2. Treat seed grains with fungicides.
3. Make germination tests of seeds.
4. Collect samples of small grain grown in the community.

SUB-UNIT III

Forage Crop Production

Specific Objectives

1. To develop an interest in forage crop production.
2. To develop the ideal of efficient forage crop production.
3. To develop the ability to understand the principles involved in the efficient and economical production of forage crops.

Sub-Unit III

The ability to understand the production of forage crops.
(3 weeks)

Sub-abilities

A. The ability to prepare soils for sowing, and to sow legumes.
B. The ability to select and buy good legume and grass seed.
C. The ability to grow sweet clover for forage and soil improvement.
D. The ability to grow alfalfa with best results.
E. The ability to grow the large legumes.
F. The ability to secure and maintain a good pasture program.

Sub-ability (A)—The ability to prepare soils for sowing, and to sow legumes.

Principles

1. With the exception of soy beans, all of our legumes in Iowa require a soil high in lime.

2. Ground limestone should be applied in sufficient quantity before the legume is sown, and disked in rather than plowed under.
3. The seed bed for soy beans should be prepared much the same as for corn, with as many weeds killed before planting as possible.
4. The seed bed for clover and alfalfa is usually prepared by thorough disking and harrowing.
5. Phosphorus, and in many cases nitrogen, will greatly increase the yield of legumes on most Iowa soils.
6. The European corn borer control program may change the manner of preparing the seed bed for our small seeded legumes.
7. All legume seed should be inoculated with the correct bacteria before sowing.
8. Soy beans may be planted with the corn planter or sown with a grain drill.
9. The small legume and grass seeds should be sown with a grass seeder and harrowed in, after the small grain has been disked in.
10. If a drill is used, they may be sown at the same time the small grain crop is sown.
11. Small legume and grass seeds should be covered shallow.
12. Legume crops are generally higher yielding and more nutritious than the grass crops.

Inductive Problems.

1. Mr. Wright has asked for a few suggestions on how to get alfalfa started. Seed is high, failures are numerous, and land has to be taken out of production when a seeding fails. So it is important to get the crop off to a good start. Explain how you would suggest to Mr. Wright that he prepare the seed bed for alfalfa. What sort of soil should he choose? How can he be sure his soil has enough lime?
2. Mr. Brown says that he has had less trouble with alfalfa failure recently than with red clover. He insists it is almost impossible to get a stand of red clover in Iowa now. How would you recommend that he prepare his seed bed and sow his seed?

Judgment Problems.

1. Mr. Smith wants to seed down a field to meadow. This field had oats on it previously, and he intends to sow fall wheat on it as a nurse crop. He wants to know whether he should plow the ground or if he can disk it and seed on the stubble; will he need to lime or can he get by with manure and commercial fertilizers? What sort of mixture should he use? How much seed of each? What can you tell him?
2. Mr. Jones has raised soy beans for several years. He uses a rotation where he has two years of beans. He has heard that with second-year beans it isn't necessary to plow, but that disking is good enough. What do you think about this?

Creative Problem.

1. Most farmers spend too much of their time in planning for their grain crops and give very little attention to their forages. Make out a list of recommendations for getting the seed bed ready on an average, all-tillable Iowa farm which you feel a farmer could follow in order to get the maximum return from his meadows and pastures.

Sub-ability (B)—The ability to select and buy good legume and grass seed.

Principles

1. Good soy bean varieties for seed production in Iowa are Lincoln, Richland, Mukden, and Illini.
2. Alfalfa varieties are Ladak, Cossack, Ranger, and Grimm.
3. Biennial yellow and biennial white sweet clover are the varieties of biennial sweet clover; Hubam is an annual sweet clover.
4. Medium red clover is superior to mammoth for most Iowa use.
5. Ladino white clover, early Korean lespedeza, and birdsfoot trefoil are new varieties of legumes which are showing much promise in Iowa.
6. Bromegrass is valuable for use in mixtures with alfalfa.
7. Kentucky bluegrass continues to be our best permanent pasture grass.
8. Timothy has a place in many hay and pasture mixtures.

Problems

1. Last year Mr. Jones purchased some high-priced alfalfa seed and sowed it in the spring with barley as a nurse crop. In August the stand was very poor and was not worth saving. What are some of the possible reasons for the failure of this seeding?
2. Iowa is now one of the leading states in alfalfa acreage but produces very little seed; hence Iowa farmers buy alfalfa seed which has been shipped in from other areas. What are some of the disadvantages of such a practice? Is it necessary, and why? What things should one consider in selecting the seed?
3. Biennial sweet clover is grown on most Iowa farms. Annual sweet clover, known as Hubam, will mature and produce a crop in one year. Why shouldn't we grow Hubam instead of the other?
4. Farmers in southern Iowa are growing Korean lespedeza in large amounts. Many farmers in central and northern Iowa would like to grow lespedeza. Do you think they can do this successfully? What varieties would you recommend?
5. The Lincoln soy bean has become very popular in Iowa. Other varieties grown are the Mukden, Richland, and Illini. Prepare a chart showing the adaptation of these varieties to the different sections of Iowa. What are the chief advantages of each?
6. Iowa has nearly as many acres in permanent pasture each year as in corn. Much of this pasture is thin and unproductive. Do you think the pasture acreage should be cut down? What kinds of crops would you suggest re-seeding our pastures with in order to make them more productive?

Sub-ability (C)—The ability to grow sweet clover for forage and soil improvement.

Principles

1. Sweet clover will grow well on poor soil if it is high in lime.
2. Soils for sweet clover must have an abundance of lime.
3. Sweet clover is one of our best green manure crops.
4. Sweet clover has much value as a pasture crop.
5. When properly handled, sweet clover makes good hay.
6. Biennial sweet clover should be plowed under in the spring of the second year to prevent volunteer growth.

7. If plowed late in the spring the ground may be too dry for corn.

Problems

1. Mr. Smith has a field which is very poor in fertility. He has applied three tons of lime during the last six months, which the agriculture teacher tells him is enough to meet the lime requirement. He would like to sow sweet clover on this field, and wants answers to the following questions:
   a. Can he expect sweet clover to grow under these conditions?
   b. Should he harvest the crop for hay, pasture it, or plow it under?
   c. If plowed under, when should he plow it, and how can he handle it to avoid trouble from a volunteer growth?
2. A neighbor has asked you for advice on the kind of sweet clover to grow. He has heard of biennial white and biennial yellow clover. He wants to know which one will produce a seed crop during the first year. Can you tell him what kind to grow?
3. Make a list of the advantages of growing sweet clover on Iowa farms.

Sub-ability (D)—The ability to grow alfalfa with the best results.

Principles

1. Alfalfa will produce more digestible nutrients per acre than any other forage crop.
2. Alfalfa is higher in digestible nutrients than any other roughage.
3. Alfalfa pasture will carry more stock per acre than almost any other pasture crop.
4. Alfalfa pasture may cause bloat in cattle and sheep.
5. Soils for alfalfa must be high in fertility and well limed.
6. Alfalfa is usually seeded in the spring with a nurse crop.
7. Three cuttings of hay each year may usually be obtained from alfalfa.
8. Alfalfa will live over a period of from three to seven years, depending upon the variety and how it is handled.

Problems

1. A field on which Mr. Jones wants to grow alfalfa has been cropped for many years but has never been seeded to alfalfa. Last year it was in soybeans. What procedure will he probably need to follow in order to obtain a successful stand?
2. Alfalfa and sweet clover are much alike. Under what conditions should each be grown? What are some of the drawbacks of each? In what important respects do they differ?
3. Make a table comparing the production of an acre each of alfalfa, timothy, red clover, and sweet clover. Compare them as to tons protein which can be produced on an acre.

Sub-ability (E)—The ability to grow the large legumes.

Principles

1. Soy beans are an excellent cash crop for Iowa.
2. They may be grown as an emergency crop.
3. Soy beans will grow on soils where other legumes will fail.
4. Soy beans loosen the soil and will cause greater erosion when planted on rolling ground.
5. Soy bean seed should be inoculated unless it is to be planted on a field which has been in inoculated beans recently.
6. The seed bed should be carefully prepared in order to aid in weed control.
7. Unless the field is free from weeds, beans should be planted so they can be cultivated.
8. Beans which are to be harvested for hay should be cut before the beans are fully formed in the pods.
9. Beans are usually combined when harvested for seed.

Problems

1. Soy beans have become one of Iowa's important crops. Many farmers are not enthusiastic about their production, however; they object to the crop for the following reasons:
   a. They loosen the soil, causing it to wash badly.
   b. Weeds are hard to control.
   c. They cannot be fed as well as our other grain crops.
   d. Some trouble has been experienced in harvesting for hay.

   How would you answer these objections?

2. Mr. Brown, who comes from Georgia, intends to plant cow peas instead of soy beans. He says they always grew them where he came from. What can you tell him about the relative advantages of these two crops?
3. Make a list of the advantages of soy beans in Iowa.

Sub-ability (F)—The ability to secure and maintain a good pasture program.

Principles

1. Most Iowa permanent pastures are unproductive.
2. Many pastures need lime and phosphorus and nitrogen fertilizers.
3. Many should be reseeded with a mixture, including timothy, alsike and red clover, and other grass and legume crops.
4. Before reseeding, pastures should be thoroughly disked to cut the sod loose.
5. Greater returns can be obtained from pastures if the field is divided and not all grazed at once.
6. Rotation pastures will improve the pasture results in Iowa.
7. Our best rotation pastures include red clover, alfalfa, sweet clover, rye, sudan grass, and mixtures.

Problems

1. Iowa's pastures are often referred to as our most unproductive crop. They make up the largest acreage of all crops. What things would you suggest could be done to improve our pastures?
2. Mr. Jones has been talking about permanent pastures and temporary pastures. Define these terms. What are the advantages of each kind of pasture? Under what condition should each be used?

Additional Activities

1. Make purity tests of small legume and grass seeds.
2. Make a field trip to collect legume roots bearing nodules.
3. Make germination tests of forage crop seeds.
4. Collect forage crop seeds and learn to identify them.
5. Treat legume seeds with inoculants.
6. Collect samples of forage crops grown in the community and press.

SUB-UNIT IV

Miscellaneous Crops

The ability to understand the relative importance of certain other crops.

Sub-ability (A)—The ability to understand the value and importance of tobacco, cotton, rice, and the sorghums.

Principles

1. Tobacco gives the highest return per acre of all important farm crops. In 1939 the average acre return was $562.77 in Connecticut.
2. Cotton production is the most important enterprise in the southern states.
3. Rice is the most important food element in the diet of millions of people.
4. Sorghums, including both grain and sweet, constitute an important factor in world agriculture.

Problems

1. From the U.S.D.A. Yearbook and the encyclopedia secure the information needed to fill in the following table on the above four crops.
   a. acreage in U. S.
   b. acreage in world
   c. value of crop in U. S.
   d. uses
   e. most important production areas

Sub-ability (B)—The ability to understand the climatic adaptation of these crops and why they are not grown in Iowa.

Principles

1. Tobacco is a native North American crop and was in use generally for a long time before the discovery of America.
2. Soils are important in producing the desired quality and blend of tobacco.
3. Tobacco production requires much skill and experience on the part of the grower.
4. Cotton is a warm weather crop.
5. A medium loamy soil is best for cotton.

6. Rice growing in the United States is centered in parts of Louisiana, Texas, Arkansas, and California.
7. Rice is a warm-weather crop which requires much moisture. Much of our production is in irrigated sections.
8. Grain and forage sorghums are adapted to sections low in rainfall.
9. During the severe drouth seasons they were grown extensively and successfully in Iowa.

Problems

1. Secure the following information on the above crops.
   a. Rainfall required.
   b. Length of growing season.
   c. Moisture required.
   d. Kind of soil needed.
   e. Amount of labor required to grow crop.
   f. Where crop is consumed.

Sub-ability (C)—The ability to understand the major uses of these crops.

Principles

1. Special varieties of tobacco are used in the production of plug tobacco and cigarette blends.
2. The consumption of tobacco is increasing rapidly.
3. Cottonseed is an important by-product of the cotton plant. It is especially important in the livestock-feeding industry in Iowa.
4. Cotton fiber is used in many industries all over the world.
5. Rice is an important food for many millions of people in the world today.
6. Grain sorghums make a very good yield in dry climates. They are excellent for feeding to livestock.
7. The sweet sorghums are grown for human consumption.

Problems

1. The smoking of cigarettes has increased very rapidly in the last twenty years. Collect facts showing the consumption of tobacco in the form of cigars, cigarettes, pipe tobacco, and chewing tobacco.
2. Cotton prices often are forced down because of too large a supply. How can you account for this when our need for cloth and clothes is continually increasing?

3. Why is it that people in the Orient depend so completely upon rice for their major food item?
4. Many farmers used grain sorghums quite extensively in Iowa during the drouth years, but have since quit raising them. How do you account for this?

Additional Activities

1. Fill box with surface field soil, water and count and identify weed seedlings that appear.
2. Collect weeds and weed seeds and learn to identify them.
3. Count seeds on a pig weed.
4. Collect weed roots to show types in relation to weed control.
5. Spray potted weeds in classroom with 2-4D.
6. Collect pollen from many plants and examine with a microscope.
7. Plant corn, oats, soy beans, and clover at varying depths to observe time to come up and how deep they may be planted.
8. Visit a seed store.

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UNIT IV. USEFUL ANIMALS

INTRODUCTION

The production of useful animals in Iowa is important because of the large amount of essential food produced from the industry and the many raw materials furnished to the various manufacturing processes. People all over the country depend on Iowa livestock for food and clothing.

It would be difficult to maintain a permanent agriculture in Iowa without a large livestock-raising program since some sections of the state are more suitable to animal production than production of raw crops.

Soil conservation is very closely related to livestock production. Hay and pasture crops can be sold in the form of meat and milk and such a program will increase the acreage of uncultivated crops. Without a well-organized livestock program many nutrients would be lost by soil erosion and there would be no way to harvest the roughage and change it into a useful product.

The material in this unit deals with the production problems and material necessary for the understanding of the livestock business. Since the producer of livestock has problems in feeding, housing, disease, parasites, selection of animals, marketing, and other procedures, they will be found in this suggested course outline. The interests and problems of the class and community should be considered in selecting material for this unit.

GENERAL OBJECTIVES

1. To develop an interest in livestock production.
2. To develop an appreciation of problems in producing livestock.
3. The ability to solve simple livestock problems.
4. The ability to know the importance of the livestock industry.
5. To develop an understanding of the reasons for good and poor animals.
6. To aid students in learning to think and to solve the type of problems with which they will be confronted in later life.

7. To give students an appreciation of possibilities of animal raising in connection with profitable leisure-time activities.
8. To develop the ability to raise livestock in the most efficient manner.

SUB-UNIT I

Poultry

Specific Objectives

1. An interest in the poultry business.
2. The ideal of producing high-quality poultry at low cost.
3. The ability to produce poultry efficiently.

Instructional Units

Sub-abilities

A. The ability to identify the most common breeds of poultry.
B. The ability to judge and cull chickens.
C. The ability to house a flock of chickens.
D. The ability to feed and manage poultry.
E. The ability to control poultry diseases and parasites.
F. The ability to buy baby chicks.
G. The ability to keep and use poultry records.
H. The ability to select and dispose of poultry products wisely.

Sub-ability (A)—The ability to identify the most common breeds of poultry.

Principles

1. Color is important in identifications of poultry.
2. Some breeds of poultry have single combs only.
3. Poultry has both white and yellow skin.

Problems

1. Make a list of the breeds and varieties of poultry found in our community. What are the characteristics of each?
2. Identify the pictures of common breeds and varieties of poultry.
3. Which one of the many breeds and varieties of poultry would you recommend for most flock owners in Iowa? Tell why you would recommend that breed.

Sub-ability (B)—The ability to judge and cull chickens.

Principles

1. A laying hen can be culled on her molt and pigmentation.
2. Culling saves both feed and labor.
3. Disease loss can be cut by culling.
4. It is quite easy to learn poultry culling.
5. Regular culling is necessary for the greatest profit.

Problems

1. Listed below are the descriptions of two layers as you might find them in any laying flock. Which bird would you consider to be the better layer? Why?

Bird No. 1	*Bird No. 2*
a. Bright red comb	a. Bright red comb
b. Yellow beak	b. Bleached shanks
c. Moist vent and bleached	c. Full feathered in wing
d. Three-finger width between pubic bones	d. Weighs about six pounds
e. Weighs about five pounds	e. Moist vent and bleached
f. Bright eye	f. Bleached beak
g. New feathers on neck	g. New body feathers

2. What relation has the previous care of the flock to the problems of culling? Explain.
3. Prepare a culling guide by making a list of descriptive terms to describe the cull and another list to describe the good layer.
4. Prepare a demonstration on poultry culling.

Sub-ability (C)—The ability to house a flock of chickens.

Principles

1. Proper housing facilities are essential to egg production.
2. Poultry houses need many improvements in Iowa.
3. Houses should be dry and warm.
4. Most houses have too many birds crowded into them.
5. Laying hens should be allowed three to four square feet of housing space.

Problems

1. Most farmers try to let the laying hens out of the house as much as possible. A small number of farmers say the hens should remain in the house as much as possible. Which practice makes for maximum egg production? Explain.

2. An agricultural engineer wishes to design a poultry house for a friend. He knows about the actual construction of the building but needs to know more about housing requirements of poultry. Tell him the main requirements of a house for 200 laying hens.
3. Plan a laying house to fit the conditions on your own farm. Specify the number and breed of hens, and any other unusual conditions which may need explanation. Give the general type, size, floor plan, general arrangements of fixtures, etc. If you have a fairly satisfactory poultry house at present, indicate how it might be improved.

Sub-ability (D)—The ability to feed and manage poultry.

Principles

1. Poultry need a balanced ration in order to get highest production.
2. Sudden changes should not be made in the feeding plan.
3. Feeders should not waste feed.
4. Large amounts of home-grown grains with the necessary balances added are most satisfactory rations.
5. Feeding is very important in the success of a poultry flock.

Problems

1. A school teacher wanted to start a small poultry flock, so he purchased 150 White Plymouth Rocks straight-run baby chicks. In six weeks the baby chicks ate 400 pounds of mash and 100 pounds of scratch grain plus 15 pounds of chick-size grit. Only five of these baby chicks died during this time. Would you say this was the correct amount of feed? Explain.
2. Rank the following feeds as a protein supplement for poultry rations:

   a. Soy bean oil meal
   b. Cottonseed oil meal
   c. Linseed oil meal
   d. peanut oil meal
   e. Coconut meal
   f. fish meal
   g. tankage
   h. meat scrap

3. Some poultry producers recommend an all-mash ration, some advise a scratch-grain and mash ration, while other producers say the whole grains free choice and a protein concentrate prove the most satisfactory. Which of these methods would you recommend? Indicate the feeding practices you would recommend under each system.

4. A very important source of protein feeds for chickens is milk. In what different forms are milk products utilized for poultry?
5. It is said that salt is poisonous to chickens and that they have been known to die of its effects. Should salt then be included in mashes and feeds?
6. The following poultry practices are used on many poultry flocks in Iowa. *Underline the practices that you would recommend.*

a. Provide suitable housing essentials.
   (1) Two and one-half to four square feet of floor space per bird.
   (2) House walls and roof tight and free from draft.
   (3) Use plenty of feeders (eight feet to 50 birds).
   (4) One water container for 50 to 60 birds.
   (5) Solid floor, concrete or wood.
   (6) Dropping boards or pits.

b. Feed layers a balanced ration the year around using available farm feeds.
c. Supplement home-grown grains with purchased concentrations, or cafeteria style.
d. Remove diseased or injured birds from flock as soon as found.
e. Burn or bury carcasses of all dead birds.
f. Cull laying flock during July and August.
g. Remove non-layers at frequent intervals during late fall, winter, and spring.
h. Use lights to provide longer days during late fall, winter, and spring.
i. Remove roosters from flock at end of breeding season.
j. Gather eggs twice or three times daily.
k. Hold eggs at temperature of 60 to 65 degrees or lower.
l. Market eggs weekly on ungraded market.
m. Keep people out of your laying house.
n. Do not use borrowed coops unless thoroughly cleaned and disinfected.
o. Keep records of egg production and mortality.
p. Keep feed records.
q. Feed pullets and old hens in same house or yard.
r. Sell entire flock of old hens by early fall.

7. *Underline the production practices in the list below that you would recommend in growing baby chicks.*
   a. Buy chicks from a mail order house or a dealer you know nothing about.
   b. Scrape, scrub and disinfect house, fountain and feeders before putting chicks in house.
   c. Keep 400 chicks in a 12 by 12 house for five weeks.
   d. Keep a good starting mash before chicks at all times.
   e. Install low roosts at six weeks in the house.
   f. Allow growing chicks to run with old hens.
   g. Provide for each chick: one inch hopper space at start, two inches hopper space at three weeks, three inches hopper space at six weeks.
   h. Temperature should be 90 degrees in house for the first three weeks.
   i. Don't feed baby chicks until they are 72 hours old.
   j. Keep feeders and waterers in sun so baby chicks will be outside more.
8. Outline a balanced feeding program for little chicks from one week to twelve weeks of age.
9. Prepare a feeding plan for your home poultry flock from the time the pullets begin to lay until the new pullets are put in the laying house.

Sub-ability (E)—The ability to control poultry diseases and parasites.

Principles

1. Early chicks are easier to raise than later chicks because of diseases.
2. Diseases and parasites may cause complete loss with poultry.
3. Prevention is more satisfactory than a cure.
4. Laying hens should be sold at the end of the pullet years as a method of controlling diseases.
5. Beware of the many poultry remedies.

Problems

1. In the many poultry magazines the following rules were suggested to keep the spread of poultry diseases to a minimum:
   a. Allow no admittance to the poultry premises.
   b. Do not visit your neighbor's flock.

c. Do not borrow or lend poultry equipment.
d. Isolate for several weeks all poultry just brought to the farm, including baby chicks.
e. Disinfect all crates and feed bags being brought to farm.
f. Completely isolate all sick birds until a diagnosis has been made.
g. Keep year round stock away from adult birds.
h. Incinerate dead birds, infertile and incubator eggs.
i. Disinfect all of the poultry houses at regular intervals.
j. Make monthly inspection for lice and mites and use a reliable remedy if found.
k. Forward all ailing birds to a reliable veterinarian for proper diagnosis.
l. Wormy birds should receive a reliable treatment occasionally.
m. Handle your birds monthly to determine their condition.
n. Construct a sound closed manure shed.
o. Use dropping pits in the laying house.
p. Raise baby chicks on clean ground.

Which of the above rules do you think are the most practical and would prove to be the most effective for raising poultry?

2. Most farmers keep some or all their laying hens over for the second laying season. Several poultry producers have told me laying hens should be sold after the pullet year. Which of these practices should be followed? Why?
3. Make a list of the common diseases of all ages of poultry, giving symptoms and control.

Sub-ability (F)—The ability to buy baby chicks.

Principles

1. The ability to lay eggs does not necessarily belong to any one breed.
2. Some breeds of poultry are better adapted for meat production than others.
3. Baby chicks should come from only the best hatcheries.
4. Select baby chicks from high producing flocks.

Problems

1. Some poultry producers buy their chicks from a hatchery which sells U. S. Pullorum Free chicks, while others buy theirs from a hatchery which sells Pullorum Tested chicks.

Which hatchery would probably have the least death loss among their chicks?

2. Describe how you would select baby chicks for a farm flock.

Sub-ability (G)—The ability to keep and use poultry records.

Principles

1. Records are very helpful in the improvement of a poultry enterprise.
2. Flock owners in Iowa keep few records.
3. A simple set of poultry records should be kept.

Problems

1. The following data were collected on feed per dozen eggs over a four-year period on 276 Michigan farms:

Eggs per Hen Per Year	Pounds of Feed to Produce One Dozen Eggs
Under 125	8.0
125-149	6.0
150-174	5.9
175-199	5.4
200 and up	5.0

What do these records show and what do they mean to the poultry producer?

2. The rate of lay per bird in Iowa is slightly over 100 eggs per bird per year. The world record for a laying hen is well over 300 eggs per year. How would you account for this difference?
3. The Iowa Demonstration Record Flocks keep the following records on their poultry enterprise:
   a. average eggs per hen
   b. per cent mortality of laying flock
   c. feed cost per hen
   d. labor income
   e. flock receipts
   f. flock expense
   g. pounds of feed per hen
   h. inventory

   Would you say that these items and several others should be kept on a poultry flock? Give reasons for your answer.
4. One year the demonstration flock records showed the following differences:

	Five high labor income flocks	Five low labor income flocks
a. Average size of flocks	221	217
b. Average eggs per hen	204	133
c. Per cent mortality of laying flocks	10.5	28.2
d. Flock investment	778.08	1022.45
e. Gross flock income	1924.22	762.82
f. Actual flock expense	566.24	518.13
g. Feed cost per hen	2.38	2.18
h. Labor income	1311.29	183.34

How would you account for these differences in the two groups of flocks? Explain.

Sub-ability (H)—The ability to select and dispose of poultry products wisely

Principles

1. Poultry and poultry products should be bought and sold by grade.
2. Eggs and dressed poultry of poor quality hinder the poultry business.
3. Improved production procedures improve the quality of poultry.

Problems

1. There are many commercial poultrymen located in California who send large quantities of eggs to Boston and New York. Can you explain why producers have not located here in Iowa where feed is easier to get and the distance to the eastern market is less?
2. I have noticed that producers use many different practices which would greatly determine the quality of products sold. Which of these practices would improve the quality?
   a. Gather eggs each evening.
   b. Sell eggs once a week.
   c. Sell eggs straight run.
   d. Store eggs in warm, dry, place.
   e. Wash dirty eggs.
   f. Store eggs in wire basket.
   g. Use only feeds that produce high quality eggs.

Additional Activities

1. Cull a laying flock.
2. Make collection of retail egg containers.

3. Candle and break out eggs in market grades to correspond with U. S. egg charts.
4. Make a scrapbook of pictures and clippings on poultry breeds, housing, feeding, etc.
5. Visit a local hatchery in operation.

SUB-UNIT II

Dairy Cattle

Specific Objectives

1. An interest in the dairy business.
2. The ideal of producing high quality dairy products at low cost.
3. The ability to manage the dairy enterprise efficiently.

Instructional Units

Sub-abilities

A. Ability to recognize the conditions that favor dairy production.
B. The ability to select breeding stock.
C. The ability to feed and care for growing dairy cattle.
D. The ability to feed dairy cows for milk production.
E. The ability to determine equipment necessary for the efficient dairy herd.
F. The ability to market dairy products for greatest profit.
G. The ability to recognize, treat, and prevent parasites and diseases of dairy cattle.
H. The ability to produce sanitary milk products.

Sub-abilities (A)—The ability to recognize the conditions that favor dairy production.

Principles

1. Dairy farming is usually carried on near large cities.
2. Dairying offers a regular income.
3. The dairy cow uses large amounts of roughage and grain.
4. Labor is an important item in dairy farming.

Problems

1. A farmer in my community reported to me that he used to milk about 20 cows, but at the present time is feeding out 30 steers instead of milking the cows. Would you agree with his choice? List the advantages of each plan.

Sub-ability (B)—The ability to select breeding stock.

Principles

1. It is always safer to select a dairy heifer whose dam and sisters have high production records.
2. The herd bull is half the herd.
3. Personal likes and dislikes should be considered in selecting dairy breeds.
4. Production records help sell breeding stock.
5. Choose animals of uniformly good type.

Problems

1. Which of the following D.H.I.A. records would you prefer if you were to select only one? (Two-year-old heifer milked two times each day for 305 days and produced 400 pounds butterfat—Five-year-old cow milked two times each day for 365 days and produced 490 pounds butterfat—Five-year-old cow milked three times each day for 365 days and produced 560 pounds butterfat.)
2. In selecting a herd sire, the most attention should be given to (his sire and dam—his producing daughters—his grandparents).
3. A proven sire is one (whose daughters produce more than their dams—whose daughters produce less than their dams—whose daughters and their dams have been tested for production).
4. The test of a cow's milk is primarily due to (inheritance—age of cow—kind of feed).
5. There is (no—some—considerable) correlation between the animal's body type and her ability to produce milk.
6. If you were interested in securing cows for milk production and for breeding purposes how much would you be willing to pay for each of the cows?

Cow number	1	2	3	4
Weight of cow	1,200 lbs.	1,500 lbs.	1,450 lbs.	1,200 lbs.
Average milk test	6.5	2.5	3.5	4.1
Annual milk production	8,000 lbs.	19,000 lbs.	18,000 lbs.	12,000 lbs.
Age	9	7	3	6

Sub-ability (C)—The ability to feed and care for growing dairy cattle.

Principles

1. The new-born calf should have the colostrum milk from the cow.
2. Home-grown dairy rations usually are most satisfactory.

3. Feeds used should be of high quality.
4. Proper feeds for the young stock will prevent sickness.
5. Proper housing is essential for good growth.
6. Heifers bred too early make poor milk cows.

Problems

1. Which of the following production practices should be listed in the record book of boys with dairy calf projects? Underline the ones you would use.
   a. Avoid over-feeding.
   b. Do not feed calf foam on the milk.
   c. Feed milk 75 degrees F.
   d. Feed one pound milk to each 10 pound calf.
   e. Put one egg in the milk.
   f. Feed milk until calf is six months old.
   g. Feed calf milk from its mother.
   h. Feed calf two pounds milk to each 10 pound calf.
   i. Keep feed pails clean enough so you can drink out of them yourself.
   j. Avoid feeding skim milk for three weeks.
   k. Change to hand feeding at one to two days.
   l. Feed one spoonful of coffee in milk.
   m. Keep calf pens above 32 degrees F. at all times.
   n. Self feed grain mixture to calf at four weeks.
   o. Let the calf run with the cow for three months.

Sub-ability (D)—The ability to feed dairy cows for milk production.

Principles

1. Dairy cows should be fed according to production.
2. Grain should be ground for dairy cows.
3. A good pasture is a source of one of the cheapest dairy feeds.
4. Legume hay is an important part of the ration.
5. Good feeding can only in part overcome lack of ability to produce.
6. Cows should have plenty of clean fresh water.

Problems

1. The largest item of cost in producing milk is (feed, labor, equipment). Explain.
2. A man recently told me that a mineral salesman came to him trying to sell minerals for livestock. The salesman

told him that the reason his cows did not give more milk than they did and were thin was because they lacked minerals. The salesman also said that lack of minerals was the cause of two of the man's calves being rather weak. *The man had been feeding a ration including alfalfa, corn silage, ground corn, oats, and cottonseed meal. His cows also had access to salt.* He bought the minerals and fed about half a handful in each feeding in addition to the grain which he fed. Do you believe that he made the right decision regarding the buying of the minerals and also the manner of feeding them? Why or why not?

3. Which of the following grain mixtures would you choose if you were feeding a roughage like alfalfa, soybean or clover hay? If you were feeding a roughage like timothy oat, hay, or corn fodder which one would you select?

	1.	2.	3.	4.	5.
Corn and cobmeal	400	200	200	400	200
Ground barley		200	200		200
Ground oats	200	400	200	400	
Wheat bran	200		200		400
Cracked soybeans	100	100	250	400	400

4. Some men of the community are following the practice of using bluegrass pasture all summer and not feeding any grain while on pasture unless the pasture gets dry. Others use sweet clover pasture. Considering the apparent cost of both methods and the probable results as to milk production, which group of farmers in your judgment is producing milk more cheaply, other things being equal? Why?
5. A large number of men in this community report that every summer some of their cows bloat while on pasture and that some cows die before they can call a veterinarian. In view of this fact, what measures would you advise them to take in preventing and controlling bloat?
6. Two men whom I know follow different methods of caring for the cows before freshening:
   Mr. A. dries his cows up six or eight weeks before calving whether the cows are giving much milk or not. He feeds the cows a liberal ration during this time, adding bran or oilmeal as a laxative feed just before calving but exercises them daily. At the same time he cuts down the feed. Just after calving he feeds nothing but warm water for twenty-four hours, then gradually increases the feed.

Mr. B. dries his cows up whenever the milk production gets down to about a quart unless it happens that it will be only three weeks until a given cow must have another calf, in which case he dries her up anyway. He feeds his cows much more lightly than he does when they are giving milk, excepting just before calving. At this time he increases the amount. He shuts the cows up when he thinks they are ready to freshen and feeds them again as soon as they are done calving.

The first fundamental for a sound dairy cattle feeding program in Iowa is (grain-roughage-minerals).

Dairy cows should be fed about (½ - 1 - 3) pounds of hay and (3 - 4 - 5) pounds of silage for each 100 pounds of the cow's weight.

During the winter months the good dairyman feeds his cows approximately one pound of grain to (1 - 3 - 15) pounds of silage for each 100 pounds of the cow's weight.

During the winter months, the good dairyman feeds his cows approximately one pound of grain to (1 - 3 - 15) pounds of milk produced per day.

Sub-ability (E)—The ability to determine equipment necessary for the efficient dairy herd.

Principles

1. Disinfect stables thoroughly and regularly.
2. Poor separators are more expensive than good ones.
3. Provide clean bedding and warm barns for young calves.
4. Keep dairy herd sire in bull pen.
5. Clean milk can be produced only in sanitary quarters.
6. Dairy barns should be easy to clean.

Problems

1. History tells us that primitive cows roamed in the open and took shelter in caves when the calves were born. Most dairymen now insist that good barns shall provide for all their cows. Why do you think they make this requirement?

Sub-ability (F)—The ability to market dairy products for greatest profit.

Principles

1. Profit from a dairy herd can be determined from production records.

2. The market pays more for high quality products.
3. Produce according to market demands.

Problems

1. The local condensery pays $3.40 per cwt. for 3.6 per cent milk. For every .1 per cent over this, 5 cents per cwt. is added. For every .1 per cent under this, 5 cents per cwt. is deducted. With this in mind, would you produce a large volume of low-testing milk or a small volume of high-testing milk, supposing that in either case the same total of butterfat were produced at the same cost?
2. I overheard a man say recently that he thought butterfat and milk prices were going to go lower in the future and that they would probably stay low for some time to come. Do you believe that this prediction will come true? Why or why not?
3. The following amounts of milk, with the tests as shown, are mixed together. What would be the test of the combined amount? (three lbs. of fat in 100 lbs. milk)

215 pounds testing 3 per cent
240 pounds testing 4 per cent
50 pounds testing 5 per cent
30 pounds testing 6 per cent

Sub-ability (G)—The ability to recognize, treat, and prevent parasites and diseases of dairy cattle.

Principles

1. People may get diseases from impure milk.
2. Heavy producing cows are subject to milk fever.
3. Diseases may destroy a dairy herd.
4. Many diseases and parasites can be prevented.

Problems

1. A man writes to the publisher of a farm paper as follows: "Gentlemen: I have had considerable trouble with caked udders in my herd. It seems that every time my cows have calves their udders stay caked for two weeks or more and for a long time I milk gargety milk. Sometimes the milk is bloody. What would you advise me to do to get rid of this trouble?"
2. The practices listed here have been recommended at some time to control Bang's disease. Underline the practices that you would recommend today.

a. Bang test the calves before they are vaccinated.
b. Cattle which are more than eight months old should not be vaccinated.
c. When once a calf has become infected with the disease the vaccine will immunize it.
d. Calves nursing positive dams may react and later become negative.
d. Vaccinated calves may run with the herd without danger of spread of the disease.

3. List 10 more good practices to use in the control of Bang's disease.
4. Outline a good defense for a dairyman who has an abortion-free herd but who has neighbors on two sides with badly infected herds.

Sub-ability (H)—The ability to produce sanitary milk products.

Principles

1. Keeping milk clean, cool, and covered makes sanitary products.
2. Clean milk comes from clean cows.
3. Milker should wear clean clothes and have clean hands.
4. Cows should be prepared for milking.
5. Clean milk doesn't need to be strained.

Problems

1. The following production procedures have been recommended by different individuals in order that the quality of milk and cream may be improved. Place a check in the blank at the left of the practice that you would recommend.
a. Use a milking machine.
b. Clean barn after milking.
c. Feed cows hay and grain before milking.
d. Wipe flanks and udder of cows with clean cloth dampened in chlorine.
e. Use small top milk pails.
f. Cool milk or cream in refrigerator.
g. Use washing powders on milk equipment.
h. Wash separator once a day.
i. Use cloth strainers for milk.
j. Use large amounts of rye pasture in rations.
k. Clip long hair from flanks and udder.

l. Fill rubber parts of milking machine with 10 per cent lye solution.
m. Cool milk or cream with cover tightly on cans.
n. Use cement floors in cow barns.
o. Use straw for bedding in barn.
p. Have milker wear white clothing.
q. Build milk room 25 feet from barn.
r. Have screen doors on dairy barn.

2. Which method of handling the cow at milking time would give the most milk and make the most money?

Plan A	Plan B
a. Keep strangers out of barn at milking time.	a. Be kind to the cow.
b. Treat cows rough if they don't milk the way you like.	b. Milk rapidly.
c. Milk slowly.	c. Practice prolonged stripping on cows going dry.
d. Wipe udders with dry cloth.	d. Milk by hand.
e. feed cows 30 minutes before milking.	e. Wash udders if dirty.
f. Milk cows at the regular hours.	f. Feed cows two to five minutes before milking.
g. Operate machine according to directions of manufacturer.	g. Milk cows in same order each time.
	h. Keep cows contented.
	i. Avoid anything that will attract attention of cow.

3. Probably two of the most serious diseases of cattle, both dairy and beef, in the United States are Bang's disease and tuberculosis. They are considered of enough importance that the state and federal governments are willing to bear part of the financial loss when the diseased cattle are slaughtered. Which of these two diseases would you judge to be the more serious? Give reasons for your opinion.

Additional Activities

1. Test milk and cream for butterfat and sediment.
2. Visit the local creamery to learn how products are processed for market.
3. Visit a dairy farm to observe cows, barns and equipment.
4. Observe a "milking parlor" in operation.
5. Compute adequate rations for dairy cattle.

SUB-UNIT III

Swine

Specific Objectives

1. An interest in swine production.
2. The ideal of producing high quality pork at low cost.
3. The ability to produce pork efficiently.

Instructional Units

Sub-abilities

A. The ability to recognize the conditions which favor hog production.
B. The ability to select breeding stock.
C. The ability to provide hog equipment.
D. The ability to protect hogs from diseases and parasites.
E. The ability to feed hogs.
F. The ability to keep and use swine records.
G. The ability to know the importance and uses of swine.

Sub-ability (A)—The ability to recognize the conditions which favor hog production.

Principles

1. Feed cost is the largest share of the cost of producing pork.
2. Hogs are very efficient converters of concentrated farm feed into meat.
3. The size of a farm may have little influence on the number of hogs raised.
4. Hog production changes from year to year, and the changes tend to move in a definite cycle.
5. Production procedures are very important in the success of a hog business.

Problems

1. Most of the counties of the United States have some hogs. They are adapted for the conversion of concentrated feed into gains in weight.
2. What feeds are commonly used for hogs? Explain.
3. Why can the pig use only limited amounts of roughage and pasture.
4. How fast do pigs gain?
5. How are pigs self-fed?
6. Why should pigs be raised on pasture?

7. Farmers living near large cities as a rule do more dairying while farmers in the cornbelt and middle west raise hogs. Why is this true? Explain.
8. Bring in a story of a successful hog raiser.
9. Why is the production of hogs so widespread?
10. Make a graph showing the average hog prices by months for several years.
11. When should hogs be marketed? Explain.
12. What are the conditions favorable to hog production?

Sub-ability (B)—The ability to select breeding stock.

Principles

1. Records should be used to select breeding stock.
2. Each breed has off-type hogs.
3. Personal likes and dislikes may affect choice of breeding stock.
4. It is preferable to select a breed most numerous in the community.
5. Most farmers raise their own brood sows.
6. Like begets like.

Problems

1. If you were going to raise hogs for yourself, what kind of hogs would you raise? What factors would you use to determine your selection?
2. Many farmers raise crossbred hogs and not purebred hogs. Would you say they are right or should they change to one breed? Explain.
3. Make a list of requirements you would think necessary in selecting breeding stock. *Examples:* The stock should be chosen from a litter of seven pigs.

Sub-ability (C)—The ability to provide hog equipment.

Principles

1. Costly hog equipment is not always the most satisfactory.
2. Movable equipment can be kept clean, and cleanliness controls disease.
3. Movable equipment may not last as long as stationary equipment.
4. Hog houses should be dry.
5. Pig brooders have proved to be very helpful.

Problems

1. Mr. Baldwin needs a new hog house on his 160-acre farm. He is wondering if he should use straw sheds, build a new 12-pen house with feed rooms, or purchase four three-pen portable hog houses. What would you advise him to do? Explain.
2. Describe the hog equipment that you have noticed on swine farms. Bring a picture or plan of your ideal hog equipment.

Sub-ability (D)—The ability to protect hogs from diseases and parasites.

Principles

1. Sanitation will go a long way in preventing swine diseases.
2. Hogs can be wormed successfully, but the best method of control is the use of clean ground.
3. Proper feeding of hogs will help control diseases and parasites.
4. Prevention is better than a cure.
5. A pig farrowed is not always a pig saved, as one-third of the pigs farrowed die before marketing.

Problems

1. Bring in several magazine articles on swine diseases and parasites.
2. Describe the clean ground method of raising hogs.
3. Outline a plan that you would recommend for swine producers to follow in preventing losses from swine diseases and parasites.

Sub-ability (E)—The ability to feed hogs.

Principles

1. It is always unprofitable to feed unhealthy pigs.
2. There is no best way to feed hogs.
3. Homegrown feeds with some balancers added usually bring about more satisfactory gains and higher profit.
4. Rations should be changed according to age and size of the pigs.
5. Pastures are important in swine rations.
6. Feed costs amount to 50 per cent of swine production costs.

Problems

1. Good feeders and feed salesmen use terms such as balanced ration, protein supplement, succulence, palatability, legume hay, minerals, and nutritive ratio. Explain these terms.

2. Hogs have a digestive tract similar to that of human beings. They are adapted for the conversion of concentrated feed into gains in weight. What feeds are commonly used for hogs?
3. Why can the pig use only limited amounts of roughage and pasture?
4. Bring in an article on feeding swine.

Sub-ability (F)—The ability to keep and use swine records.

Principles

1. Farrowing and production records will pay for the time used in keeping them.
2. The best way to improve swine efficiency is by comparisons of records.
3. Swine Breed Associations are using more records to select purebred breeding stock.
4. Records have little value unless they are used.

Problems

1. A future farmer raised a spring litter of pigs. After he had finished the project he listed the following items in his record book:
   a. Number of pigs weaned per sow *eight.*
   b. Number of pounds of pork produced per litter *1635.*
   c. Hog income per sow *$315.45*
   d. Average weight of pigs at six months *204.*
   e. Number of pounds grain required to produce 100 pounds gain *492.*
   f. Feed cost in producing 100 pounds gain *$12.10.*
2. Bring in several news articles showing the production records of swine producers.
3. Which farmer did the better job of producing pork from the records listed below:

	A	*B*
a. Number of pigs saved per sow	6	9.6
b. Average weight of pigs at 6 months	212 lbs.	176 lbs.
c. Average daily gain from weaning time until marketing	1.56 lbs.	1.2 lbs.
d. Pounds of pork produced per sow	1272 lbs.	1629.6 lbs.
e. Pounds of grain fed per 100 pounds gain	352 lbs.	324 lbs.
f. Pounds of supplement per 100 pounds gain	50 lbs.	61 lbs.

4. Look up the records of the Master Swine Producers.

5. Work out a record system which you can use on your home farm in checking on the efficiency and economy of producing pork.

Sub-ability (G)—The ability to know the importance and uses of swine products.

Principles

1. Many people are connected with the swine industry.
2. Swine income is very high in Iowa.
3. Hog prices and business conditions usually move in the same direction.
4. Swine production can be used as a hobby or a business.

Problems

1. What happens to the hog when marketed? Where are all the hogs used that are produced in the United States? What determines hog prices? What products are obtained from hogs other than meat?
2. Hogs yield, when slaughtered, meat (pork), such as loins, shoulders, pork chops, and cuts that are cured, such as ham and bacon. The fat from hog carcasses is rendered into lard.
   a. What per cent of live weight for a hog goes into these foods?
   b. Which of the pork cuts are in the greatest demand?
   c. What are the by-products from the slaughtered hogs?
   d. Why do factory payrolls and hog prices tend to move together?
3. Prepare a graph showing the comparison of the Iowa swine income to dairy, beef, poultry, corn, oats, and soybeans.

Additional Activities

1. Make a field trip to observe farrowing house, feeding methods, etc.
2. Visit a packing plant to study market grades of live hogs, carcasses, meat cuts, injuries from handling, diseases, and meat products.
3. Mix sample rations using standard formula.
4. Collect lice and mange parasites and eggs and study with microscope.
5. Collect feed label tags—compute cost per pound of protein.
6. Visit a farm to observe the swine enterprise.

SUB-UNIT IV

Beef Cattle

Specific Objectives

1. An interest in the beef cattle industry.
2. The ideal of producing high quality beef at low cost.
3. The ability to manage a beef cattle enterprise successfully and efficiently.

Instructional Units

Sub-abilities

A. The ability to recognize the conditions that favor beef production.
B. The ability to select desirable breeding and feeding cattle.
C. The ability to feed and house beef cattle.
D. The ability to control cattle diseases and parasites.
E. The ability to market beef cattle efficiently.

Sub-ability (A)—The ability to recognize the conditions that favor beef production.

Principles

1. Cattle consume large quantities of roughage.
2. Beef cattle can be used on low, wet land or rough land.
3. Beef cattle require less labor than other farm animals.
4. Beef cattle can help equalize farm labor throughout the year.

Problems

1. A large number of beef calves are born in the western states, shipped to the cornbelt for a time and slaughtered east of the Mississippi River. Explain why you think this is done.
2. A farmer has a 230-acre farm along a river. About 60 acres of the farm is wet pasture land, and the other 170 is all under cultivation. The barns would take care of about 24 cows and calves. The farm has no silo, but 40 tons of loose hay could be put in the barn. About 20 farrowing pens are available. Would you say this farm should raise dairy cattle, purchase beef calves and feed them out, or breed calves on the farm and feed them out?
3. Would a dairy cow producing 300 pounds of butter fat make more or less profit than the income from a steer weighing 1,000 pounds, with present prices? Explain.

Sub-ability (B)—The ability to select desirable breeding and feeding cattle.

Principles

1. Only good feeders make good-choice-beef.
2. The feeder should consider the kind of feeds available.
3. The type of cattle has much to do with profits.
4. It is profitable for many feeders to produce their own feeder stock.

Problems

1. Here are pictures of four beef cows. Look these pictures over and decide which would be the best one to buy for the same price. Write out your reasons for your selection.
2. Compare a beef cow to a dairy cow.
3. Describe the kind of a calf a 4-H member would need to enter the baby beef project.
4. When should a cattle feeder feed calves, yearlings, or two-year-olds?
5. Some cattle feeders buy feeders in the spring before grass starts, and other feeders buy in the fall. Which plan would you recommend? Why?

Sub-ability (C)—The ability to feed and house beef cattle.

Principles

1. A supplement should be used when fattening on grass.
2. Salt should be fed at all times.
3. Beef cattle need mineral.
4. Breeding cows need not be kept fat.
5. Pasture and roughage should make up a large part of the ration.
6. Higher grades of cattle use more grains and concentrates.
7. Beef cattle need a limited amount of equipment.

Problems

1. Beef cattle producers mention the following when discussing feeding: Explain what each term means. Protein, minerals, roughage, supplement, silage, concentrate, ration, vitamins.
2. Which one of these rations would you use to feed a baby beef if you were going to enter the beef project? *Give your reasons for your choice.*

Ration No. I	Ration No. II
6 parts cracked corn	6 parts cracked corn
4 parts oats	2 parts oats
1 part linseed oil meal	2 parts molasses feed
Alfalfa or clover hay at will	1 part soybean oilmeal
	Red clover hay at will

3. What are some of the feeding practices and management practices followed by beef cattle feeders and breeders in this community, and what changes might be made in order to enable farmers to produce beef more efficiently?
4. Bring in plans of a beef barn or shed that you would consider very satisfactory. Tell why you selected this plan.
5. Plan a beef feeding barn which you would prefer if you were the owner of your farm and could construct the type of barn you desired.

Sub-ability (D)—The ability to control diseases and parasites of beef cattle.

Principles

1. Prevention and control of animal diseases is the aim to keep in mind.
2. Careful management and feeding is the foundation of disease control.
3. "Cure-alls" should be avoided.
4. Healthy cattle make more profit.

Problems

1. Common diseases and parasites are listed below:

Tuberculosis	Pneumonia
Abortion	Warts
Blackleg	Ringworm
Lump Jaw	Lice
Scours	Mange
Bloat	

Which one of these causes the most damage to beef cattle? Why?

2. Describe a program for a beef producer to follow if diseases and parasites of beef cattle are prevented or controlled.

Sub-ability (E)—The ability to market beef cattle efficiently.

Principles

1. Cattle of dairy type will not sell at so high a price as beef-type cattle.
2. Cattle prices vary according to seasons.
3. Beef heifers sell below the price of beef steers.
4. Seasonal price and supply changes ordinarily limit the length of the feeding period.
5. A cattle feeder must be a good buyer and seller.
6. Uniformity is important in selling cattle.

Problems

1. You hear cattle producers and buyers using the terms: shrinkage, fill, commission firms, direct packer buying, blocky, canner, feeders, heifer, stag. What is meant by each term?
2. The following are marketing plans used by three feeders:

   Feeder No. 1

   Markets 1100 pounds choice steers in October.
   Ships directly to a Chicago Commission Firm.
   Cattle are trucked to market.

   Feeder No. 2

   Markets 800 pounds steers in July.
   Sells through a local cattle buyer.
   Cattle are trucked to market.

   Feeder No. 3

   Markets 1250 pounds choice steers in March.
   Sells through a producers' cooperative.
   Cattle are shipped by rail.

   What is the price outlook for beef cattle?

Additional Activities

1. Visit locker slaughter plant; study cuts of beef, yield of various cuts, quality or grade, and grub injury to hides.
2. Visit a beef cattle farm in the community.

SUB-UNIT V

Sheep

Specific Objectives

1. An interest in sheep.
2. The ability to raise sheep efficiently.

Instructional Units

The ability to raise sheep efficiently.

Sub-abilities

A. The ability to determine the possibilities of sheep production in this community and on the home farm.
B. The ability to select, to breed, to feed and care for sheep properly.

Sub-ability (A)—The ability to determine the possibility of sheep production in this community and on the home farm.

Principles

1. There is a place for more sheep on many Iowa farms.
2. Sheep need small amounts of labor compared to other kinds of livestock.
3. Personal likes and dislikes affect sheep success.
4. Land not suitable to cultivation produces sheep instead of hogs or dairy cattle. Explain why you think this true.

Problems

1. A number of F.F.A. boys in Iowa have sheep projects. If you were to have a sheep project what would be some of the problems that you would have with such a project.
2. Read an article about sheep or talk to a person who has raised sheep. Report your finding to the class.
3. Some of these F.F.A. members raise purebred sheep, some raise market lambs, and others buy the lambs and feed them out for market. Which plan would be the most profitable? Explain.

Sub-ability (B)—The ability to select, to breed, to feed and care for sheep properly.

Principles

1. Ewes require plenty of exercise while pregnant.
2. Clip wool around teats before lambing.
3. Confine ewe to separate pen before lambing.
4. Feed in clean troughs.
5. Feed should be clean and free of mold.
6. Ewes should be bred to lamb when two years old.
7. Ewes should be flushed before breeding.
8. Lambs should be coched before 10 days old.
9. Fat lambs usually sell higher in June.
10. Good breeding stock pays.

11. The ram is important in improving the flock.
12. Good management is important in successful sheep raising.
13. Unhealthy sheep will make small profits.
14. Good pastures are important in sheep business.
15. Prevention of sheep diseases and parasites is more satisfactory than a cure.
16. Barns should be dry and free of drafts.
17. Sheep require tight fences.
18. Timothy hay is poor sheep feed.
19. Dip after shearing.
20. Early lambs are less subject to worms.

Problems

1. The other day as I was driving along the road I saw some sheep that had no wool on their heads or legs. Which breed of sheep did I see? How many different breeds of sheep do you know and recognize? Give the main characteristics of each breed.
2. One boy interested in raising sheep wanted to start by buying several ewe lambs but he was advised to buy ewes which were from one to two years old instead. Which plan should this boy use? State your reasons.
3. Boys raising sheep must decide which of these practices they should use. Underline the practices that you would recommend.
   a. Flush ewes two weeks before breeding season.
   b. Trim the docks of the ewes.
   c. Smear a lamp black paste on the brisket of ram each day.
   d. Ewes are fed alfalfa hay, oats and soybean meal during winter.
   e. Ewes are clipped in May.
   f. Wool is shipped and sold through wool cooperatives.
   g. Lambs are marketed in late fall or early winter.
   h. Ewes lamb in individual lambing pens.
   i. Lambs are allowed to wean themselves.
   j. Ewe lambs are docked with sharp knife at 3-5 days old.
   k. Male lambs are not docked.
   l. Market lambs are self fed.
   m. Salt is the only mineral used in the flock.
   n. Dip sheep before shearing.

o. Market lambs weighing 110-125 pounds.
p. Keep away from ewes at lambing time.
q. Use sheep to utilize waste roughage on the farm.
r. Use concrete floor in sheep shed.
s. Twenty square feet is allowed per ewe in sheep shed.
t. Straw loft houses should not be used in sheep shelters.

4. Prepare a list of 25 production procedures that you would recommend for most flock owners to follow with the farm flock.
5. Outline a program of sheep feeding and management practices which will be used on your home farm to control sheep diseases and parasites.
6. Outline a plan you would recommend in feeding out market lambs. Kinds and amounts of feeds, methods of feeding, equipment used and length of feeding period should be included in your plan.

Additional Activities

1. Collect specimens of sheep lice and ticks.
2. Collect and study wool samples—compare with U. S. samples from U. S. Bureau of Animal Industry.

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BULLETINS (IOWA)

Address Iowa Agricultural Experiment Station, Ames, Iowa

Swine

P59 Brood Sow and Litter Feeding Management
P73 Hog Cholera

Sheep

P4 Quality Lamb Production
E230 Buying and Feeding Lambs

Poultry

E200 Feeding and Management of Hens
E263 Sorting the Laying Flock
P47 Growing Chickens

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Beef Cattle

Judging Beef Cattle	Farmer's	Bulletin	1068
Beef Cattle Breeds	"	"	1779
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Dairy Cattle	Farmer's	Bulletin	1769
Feeding Dairy Cows	"	"	1626
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Production of Cleaner Milk	"	"	602

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Hog-lot Equipment	"	"	1490
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Diseases and Parasites of Poultry	Farmer's	Bulletin	1652
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Standard Breeds and Varieties of Chickens	"	"	1506

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Breeds of Sheep for the Farm	Farmer's	Bulletin	576
Diseases of Sheep	"	"	840
Judging Sheep	"	"	1199
Parasites and Parasitic Diseases of Sheep	"	"	1330

VISUAL AIDS

Market Cuts of Meat	U. S. Department of Agriculture
Market Classes	U. S. Department of Agriculture
Breed Types and Models	Livestock Registry Associations
Soils and Soil Conservation	Soil Conservation Service
Poultry Breed Pictures	American Poultry Journal
Meat Charts	Packing Plants

Numerous slides, film strips, and motion picture films are available for teaching purposes. It is suggested that schools build up libraries of slides and film strips, and secure lists of available visual aids from various sources.

Visual Instruction Service, Iowa State College, Ames, Iowa.

Agricultural Leader's Digest, 139 N. Clark St., Chicago, Illinois.

UNIT V. FRUITS AND VEGETABLES

INTRODUCTION

Since there are a large number of high schools in Iowa teaching general agriculture, there is a real need for some subject matter that could be used in a course in Horticulture. At this time with the economic situation serious as it is all over the world, it seems that much can be done throughout schools in giving training to high school students in producing food and vegetables for family use. Training of this kind will not only help in giving the family a balanced diet but will help in balancing the budget.

This course does not cover all the problems that might arise, but we have tried to include those most useful and practical. We realize the time for this course is quite limited. We are hoping that you will select those problems best adapted to your locality and the time you can afford to spend on them.

GENERAL OBJECTIVES

1. To develop the ability to maintain or improve our standard of living by the increased use of vegetables in building a good health program.
2. To develop sufficient interest in gardening so that a large share of our leisure time might be taken up by continued worthy activity in the home.
3. To provide better environment where children may develop character through contact with nature.
4. To promote and teach a more wholesome respect for and sence of responsibility on the part of the individual to his country.
5. To assist the farmers to become more thoroughly prepared nigardening through carefully planned educational and vocational training.
6. To develop command of the fundamental processes through the use of records and projects.
7. To develop thinking ability.

SPECIFIC OBJECTIVES

1. A. An interest in orcharding.
   B. The ideal of building up an adequate orchard for home use.

C. The ability to organize and maintain an orcharding program for the farm home.

2. A. To develop an interest in vegetable gardening.
   B. The ideal of raising sufficient amount of high quality vegetables for home use.
   C. The ability to carry on an adequate and profitable vegetable program for the home.

SUB-UNIT I

The Ability to Organize and Maintain an Orcharding Program for the Farm Home.

Sub-abilities

A. The ability to locate and plan the orchard.
B. The ability to plant and maintain an orchard.
C. The ability to organize a small fruit garden.
D. The ability to prune fruit trees and small fruit plants.
E. The ability to control pests and diseases.
F. The ability to harvest and store fruit.

Sub-ability (A)—The ability to locate and plan the orchard.

Principles

1. The lighter rolling soil types are most suitable for orchards. Many varieties of fruit trees and small fruits will grow well, however, in almost any kind of Iowa soil.
2. The orchard should be on a slope. An incline provides air drainage as well as water drainage.
3. The most desirable slope is a north slope.
4. Fruit trees should never be planted in depressions between hills.
5. Tender varieties should be planted in the southern part of the state.
6. Select only varieties that are hardy.
7. Get varieties that pollenize easily.
8. Spring planting has been found more satisfactory.

Problems

Inductive

1. Mr. Blight has a farm of 40 acres rather rough and hilly, with many depressions. He thinks he might be able to secure a small farm with land better adapted to his purpose. Tell him the type of land best adapted to his purpose.
2. Mr. Blight finds a piece of land which has excellent soil and the preferred northern slope. However, before he decides to make a change, what other location factors should he consider?

Judgment

1. Mr. Appleblossom lives in northern Iowa. He has a 20-acre tract which he wants to make into an orchard. He has many nursery catalogues offering fruit trees for sale. Friends have been telling him and his wife what he should do. Both Mr. and Mrs. Appleblossom are confused as to what kind of fruit raising their location is best suited. Should they decide themselves, or should they consult the Extension Service for information? Why?
2. Mr. Codlingmoth owns a farm in southern Iowa. He wants to put in 15 fruit trees. There is a south slope close to the house available for orchard use. One fourth mile from the house is a north slope which could be used for an orchard, and another place is a low spot west of the barn with very rich soil. Which location would you recommend to Mr. Codlingmoth? He will surely ask you the reasons for your choice. What are they?

Creative

1. You may sometimes have to pick an orchard site. The slope on which an orchard stands is important. Make a map showing two good slopes for fruit-tree raising. Put compass directions on the map.

Sub-ability (B)—The ability to plant and maintain an orchard.

Principles for Securing Nursery Stock

1. The fruit grower must buy his nursery stock from reliable commercial nurserymen.
2. Go slow in trying out new varieties.
3. Two-year-old is recommended for Iowa.
4. Only root-grafted apple trees should be used. Budded plum, cherry, pear, and peach trees are all right.

5. The number of trees needed will depend on the size of the orchard and the combination you like to make with a vegetable garden. The following distances are often allowed between trees: apple—35 feet; plum—16 feet; cherry—18 feet; and peach—16 feet.
6. The Extension department says the average home orchard might have ten to fifteen apple trees, five or six plum trees, three or four cherry trees and some peach trees if the climate permits.
7. Ten or more acres are needed for a commercial orchard.
8. Select only fruit varieties that are hardy in your section.
9. Early spring planting is more satisfactory than fall planting.
10. The land should be cultivated well before planting trees.

Principles for Planting Nursery Stock

1. Tilled soil is best for trees.
2. Lay out the orchard.
3. Dig a deep hole; roots should be in a natural position; prune broken roots; pack soil firmly around the roots.
4. All newly set trees should be pruned back.
5. If nursery stock cannot be planted on arrival, heel in.

Principles in Giving General Care

1. Inter-cropping may be used in the orchard.
2. Filler trees may be used.
3. Cover crops may be used.
4. Cultivation is very important.
5. Permanent sod may be satisfactory in some cases.
6. Orchards should not be used for grazing.
7. Commercial fertilizers containing nitrogen are helpful.
8. Pruning should be done when necessary.
9. Top-working on Hibernal or Virginia Crab stock should be done at the right time.
10. Prop trees when heavily loaded with fruit.
11. It is sometimes necessary to thin fruit where trees are too heavily loaded.

Problems

Inductive

1. Jack Appletwig is a boy. He loves apples of course. He bought some Jonathan apples in a store. He would like to raise some Jonathan apples, so he saved the seed from the

apples he bought. In the spring he will plant these seeds and get Jonathan apple trees. Please come to Jack's rescue. Tell him how to get trees that will surely bear good Jonathan apples.

2. Mr. Hardy has nursery catalogues from New York, Michigan, Virginia, Minnesota, and California. All of these catalogues have wonderfully colored pictures. He also has a plain little catalogue from a nursery near home; although it is small, this nursery is thoroughly reliable. If Mr. Hardy should ask you for your opinion on where to buy nursery stock for this new 10-acre orchard, what would you tell him?
3. In his haste to get young apple trees planted early, Mr. Ned Pruning's son forgot to find out if there was anything that should be done to trees after planting. What attention do newly planted trees need?
4. Very few farmers give their orchard much thought. As a rule they do not even think of cultivating the orchard soil, although they do cultivate their other crops. What can you say pro and con on the topic of orchard cultivation?

Judgment

1. As only two old apple trees are left on his farm, Mr. Bordeaux has planned to put in 30 new apple trees on the farm "Hill." He wants apples just for home use, and says he intends to plant the trees 20 feet apart. Should he go ahead as planned or would it be better to get only 10 to 15 trees and plant them 35 feet apart? What are the reasons for your decision?
2. Following the slogan "Buy nursery stock early," Mr. North gets his shipment of trees just as a rainy spell arrives. The ground is very muddy. Would you advise him to (1) plant the trees at once, (2) keep the trees in their shipping package in the cellar, or (3) heel in the trees? Why?
3. Mr. Appleseed is thinking of planting an apple orchard with trees 20 feet apart. When the trees get large enough to crowd each other, he plans on cutting out every other tree in the row. He has also thought of planting apple trees 35 feet apart and putting cherry trees in all the rows as filler trees. Which plan would you recommend? Your reasons?

Creative

1. Make a chart showing the size of your orchard, distance between trees, varieties wanted and where they will stand, kind and location of filler trees or filler crops.
2. Make a chart showing a root-grafted tree complete; a budded tree complete. Put in suitable information about each.
3. Many people can understand a chart more clearly than a written explanation. Make a chart showing (1) a young apple tree planted correctly, and where it should be pruned; (2) a tree incorrectly planted and pruned.
4. To show how pruning should be done on older trees, prepare an illustrated chart showing (1) a tree before pruning, and (2) the same tree after pruning.
5. Most people leave a stub on a tree when they cut off a limb. Make illustrations of (1) a stub on a tree and (2) a wound on a trunk showing where a limb was properly cut off.

Sub-ability (C)—The ability to organize a small fruit garden.

Principles

1. Small fruits grow on almost any soil but do best on any loam soil.
2. Do not plant berries on old berry patches.
3. Plant small fruits on high ground.
4. If you plan to grow market crops, do so near the markets.
5. Consult people who have been engaged in this business.
6. The size of your patch will depend on your purpose.
7. Small fruits need plenty of moisture.
8. Choose only the kinds of fruit that have proved most hardy.
9. In choosing strawberries get only staminate varieties.
10. Buy only from a reliable nursery.
11. You may grow your own stock.
12. Medium-sized plants are preferred.
13. Lay rows out wide enough for power cultivation.
14. Get all rows straight, grapes eight feet apart, berries not less than six feet.
15. Make distance between plants, strawberries 12 inches, bramble berries three feet, grapes eight feet.
16. Trim roots back before planting.

17. In planting dig hole plenty large.
18. Plant in the spring.
19. Guide strawberry runners along the row.
20. Fence all small fruit acreages.
21. Use animal fertilizers.
22. Irrigate crops when necessary.

Problems

Inductive

1. Mr. Berry has a large field. The soil is rich and mellow. Potatoes were raised on it last year, so the soil is well cultivated. There are several gentle slopes. To avoid damage from late spring frosts which slope should Mr. Berry select for raising strawberries?
2. Mr. Pulp has his grape plants on hand and has gone out in the field to lay out the rows. He has marked off the first row, but is confused as to the best distance between rows. Suppose you happen along. How far from the first row would you tell him to mark off the second and succeeding rows?
3. Mr. Mulch bought 200 strawberry plants. When he planted them, he was very careful to spread out the roots, but he did not prune any part of the plant. What part should he have pruned? Why?
4. By getting vigorous plants and cultivating regularly throughout the summer and fall, Mr. Leafroll has started a very promising strawberry patch. When cold weather arrives, what special treatment should he give his berry patch? Why?
5. Mr. D. has started a vineyard of 100 vines. They are in their third year. He has each vine growing on a stake. What arrangements will soon be needed for the proper training of the vines?

Judgment

1. Mr. Bramble has a field divided into four sections. Last fall he plowed all of them. One section raised corn, another raised potatoes, one raised strawberries (third crop), and one was a pasture. Which of the sections might he use for his new strawberry patch, which he will start this spring?

2. Three Iowa locations are available for a small fruit farm to Mr. Slope. He can get flat bottom land close to the Missouri River, some low rolling land near high bluffs east of the river, or some gently rolling land farther east. He wants to raise grapes, so please recommend a farm to him, and tell him why you favor your selection.
3. Mr. Cane has marked out rows for grapes with lines running up and down a rather steep hillside. He has done this so as to make cultivation easier. Should he plant his grape plants in these rows or should he mark off new rows which follow the contour of the hillside? Why?
4. Mrs. Pome Fruits finds her strawberry plants spreading rapidly. Runners are going everywhere. "I haven't the heart to cut any runners off, and besides the more runners the more berries," she says. She will soon have a solid blanket of plants. Should she continue this way? Why? Why not?

Creative

1. Draw a map of United States. On it locate the main grape growing regions and bramble-berry regions.
2. With sketches show straight row planting and also contour plantings.
3. Make drawings showing necessary pruning cuts on small fruit seedlings at time they are planted permanently.
4. Sketch pruning operations on a grape vine. Show drawings of five successive annual treatments, starting with the first year, in the life of the vine.

Sub-ability (D)—The ability to prune fruit trees and small fruit plants.

Principles (Fruit Tree Pruning)

1. Pruning a branch stimulates growth.
2. Pruning a tree has a dwarfing effect.
3. Pruning a tree delays its coming into bearing.
4. Pruning decreases the crop in young bearing trees.
5. The main purpose in pruning the tree is to secure a good frame work.
6. Narrow angled branches form weak crotches.
7. Upright branches should be pruned out.
8. Avoid leaving a branch directly over another.
9. Pruning stimulates growth only in the vicinity of the cut.

10. Severe cold frequently causes injury near fresh pruning wounds.
11. Prune young trees the latter part of the dormant season usually in February or March.
12. The first year the young tree should be pruned back.
13. Scaffold branches should be headed back.

Problems

Inductive

1. Mr. Careless has noticed several limbs on the trees in his orchard have split away from the main trunk of the tree. Explain the possible cause for this condition.
2. Mr. Doesn't Know has fifty young apple tree whips to plant. How would you advise him to prune these young trees? Why?
3. Mr. Grooms pruned a five-year-old apple tree quite heavily one year. Other trees seemed to bear well that had not been pruned, but this one had very little fruit that year. What is the explanation for this?
4. Mr. Hopeful has a young orchard coming on. Most of the trees will be four years of age. In pruning the following spring what should he keep in mind so his trees will have the proper shape?

Judgment

1. The opinion is sometimes heard that since pruning delays initial bearing, all pruning should be postponed until the bearing habit is established. Do you agree with this statement? If so, why? If not, why not?
2. From an orchard of the same variety of apples a test showed that the unpruned trees yielded an average of 17.9 bu. per acre and the pruned trees yielded 13.2 bu. per acre. A better price was secured for the apples from the pruned trees, however. Would it be better to prune or not to prune the trees? Why? Why not?
3. It seems that one grower prunes his trees to promote wood growth and that his neighbor prunes the same variety for greater fruit production. Which is correct? Why?
4. One farmer chose to prune his apple trees in the late summer, and his neighbor pruned his trees in the late winter before growth started. Which will be the more satisfactory? Why?

Creative

1. Make a list of the tools and materials needed for pruning.
2. Figure how many lateral branches a tree should have at the end of four years to be well balanced.
3. Sketch a two-year-old apple tree, showing the relative distance between lateral limbs and where each should be cut to be pruned properly.
4. Make a list of the advantages and disadvantages of pruning from a ladder or by climbing a tree.
5. If it takes 40 minutes to prune a mature tree, figure the cost of pruning your orchard at the prevailing prices of farm labor.

Principles (Small Fruit Plants Pruning)

1. After planting the first year, blackberries should be cut back to 15 inches.
2. The second year after planting the new shoots should be cut back to about 24 inches, the third season the height should be about 30 to 36 inches.
3. The red and black raspberries should be allowed to develop only three to five new shoots.
4. Cut out all dead, weak, or broken diseased canes.
5. Lateral branches on raspberries should be cut back to 10 to 12 inches.
6. Red raspberries are not tipped during the summer as they do not branch. They are pruned back to 30 inches during the dormant season.
7. The largest berries are borne on shoots originating from the basal and middle portion of the canes.
8. Thin out, leaving six to eight vigorous canes per hill, four to eight inches apart.
9. The lower horizontal branches should be trimmed off. (See next line.)
10. The currants and gooseberries are perennials, and the fruit is borne toward the base of one year wood. The older the wood, the less fruiting vigor. Cut back currants and gooseberries at planting time. Allow to grow into a bush of eight or ten canes.
11. The amount of trimming depends on the vigor of the plant.

Problems

Inductive

1. Mr. Thorn has ordered 50 raspberry plants. He has prepared the soil and staked out the rows. They may come at any time. How should he prune them before planting? How should he prune them the first year?
2. Mr. Not Thinking prunes his red raspberry the same way he prunes his black variety. How does pruning differ for the different varieties?

Judgment

1. Mr. Henry argues that by leaving more canes he will get more raspberries, but Mr. John claims by thinning out and heading back he can increase the yield. With whom do you agree?
2. Mr. Koons starts to thin his raspberries. Would you advise him to leave two, eight, or twelve canes per hill? Why?
3. Mr. Soakem has some mature gooseberry bushes. He believes they should be pruned out at the center for the most part, and Mr. Soakup thinks they should be pruned more heavily on the lower branches. Is either of these men correct? If so, why? If not, why not?

Creative

1. Make a list of the tools and materials needed to prune bush and bramble fruits.
2. Lay out a plan for pruning a gooseberry patch that has never been pruned before.
3. Make a diagram showing a black raspberry and a red raspberry cane, showing the difference in the way the canes grow.
4. List the steps necessary to renovate a raspberry patch that has been badly neglected.

Sub-ability (E)—The ability to control pests and diseases.

Principles

1. When you raise truck crops, you must fight insects and diseases continually.
2. There are numerous very effective chemicals now in use. Get circulars from Extension Department.
3. To avoid white grubs, do not raise a garden on sod land.
4. Do not put fresh manure on land that is to raise root crops.

5. Do not lime land to be used for growing potatoes.
6. Crop rotation helps to reduce insects and diseases.
7. Fence the garden well to keep out livestock and poultry.
8. Kill gophers, moles, and mice.
9. Encourage birds to live around your garden.
10. Chewing insects may be controlled by the use of stomach poisons.
11. Sucking insects are controlled by the use of contact poisons.
12. Fungus diseases may be controlled by sanitation and the use of lime sulphur and bordeaux mixture sprays.
13. Fire blight is a bacterial disease controlled by choosing resistant varieties, clean culture, and sanitation.
14. Dormant sprays used in March and April control oyster shell and San Jose scales.
15. The calyx sprays control the codling moths, canker worms, curcalio and apple scale.
16. The cluster bud spray combats apple scale, pear scale, and canker worm.
17. Fungus diseases are worse in wet years.
18. Trees are often banded to catch the codling moth larvae.
19. Apply only the sprays needed to combat the pests present. Thoroughness and timeliness is important. Sanitation and clean cultivation combat pests also.

Problems

Inductive

1. Noticing some jelly-like stuff at the base of some of his peach trees, Mr. Applebutter got curious. He took out his knife and scraped off the jelly. In the bark underneath was a hole. He dug into the bark and found a white worm. It had eaten out a big spot under the bark. What kind of worm did Mr. Applebutter find? When should he inspect his tree for this kind of worm?
2. Early in the summer Mr. Top Grafting found many small apples on the ground. Many had worms inside. What kind of worms were they? What treatment should he give the trees?
3. Some boys were playing in an orchard. They noticed a large mass of webs on the end of a limb. They thought it must be a large spider's nest and told their father about it. He promptly burned them. What was it the boys really found? What treatment besides burning could have been given?

4. With the arrival of spring some boys often went to the field to see what their father was doing. One day they cut across the orchard and noticed the bark of some young trees had been scraped off. What pest had done this damage, and when? How could such damage have been prevented?
5. Mr. B. is concerned about his apple trees. The leaves on his neighbor's trees last year were infected, showing orange and yellow spots. There are some similar spots on the fruit. The orchard is located inside an evergreen windbreak. Mr. B. is afraid his trees might become infected. What is this disease and how might he control it?

Judgment

1. Mr. Stone is starting a peach orchard. He has heard about peach borers. He wants to know if he should (1) spray the trunks, (2) dig out the worms in June and early fall, (3) wrap the trunks each spring with newspapers, (4) pay no attention to the borers. Which would you say he should do?
2. Mr. Canker knows that he should spray his trees to check damage from codling moth larvae. Should he spray regularly every two weeks or should he consult the vocational teacher telling him when to spray? Why?
3. Mr. Curculio sees birds around his orchard. Most of them are song birds. He is wondering if he should shoot them or leave them alone. What would you say he should do about the birds? Why?
4. Mr. Scab has an orchard of bearing apple trees. It is a damp rainy season. The orchard is sod. Will diseases or insects be more likely to harm this man's trees and what kind of sprays will he have to use?

Creative

1. Prepare for display purposes one or more charts showing common tree pests, how they do damage, and how they may be controlled.
2. Make a chart showing the names of pests and diseases, when and what to spray or what to do to control them, and the cost of chemicals.
3. List the possible ways of getting the home orchard sprayed if one does not have the equipment.

4. List the equipment needed if one wants to do his own spraying.
5. If it takes six gallons of dilute spray material to spray a twenty-year-old apple tree, how much arsenate of lead would a farmer have to buy to spray five apple trees five times? It takes one and one-half pounds of arsenate of lead per fifty gallons of mixture.
6. In the above problem how much lime sulphur would be required to spray the trees four times?

Sub-ability (F)—The ability to harvest and store fruit.

Principles

1. Pick apples when nearly ripe. Use a basket lined with cloth. Lay each fruit gently in the basket. Pick the fruit with a twisting motion. Leave the stem on the fruit. For shipping apples must be packed tightly in baskets, boxes or barrels. Boxes are preferred in the West, barrels in the East, baskets in Iowa.
2. Pick pears before they get soft. Handle them more carefully than apples. Keep in a cool place to ripen. Pears taste better when ripened in this way than when allowed to ripen on the tree. For shipping pears are packed in baskets or boxes.
3. Pick cherries with stems on. Cherries are red some time before they are ripe. Pick them when they are ripe, because the flesh is fully developed. For selling pack in baskets or lugs.
4. Plums should be picked when fully ripe, for home use. If they are to be shipped, they must be picked earlier and packed carefully in baskets.
5. If you want to sell fruit, you must find or attract buyers. If you live on a good highway, you can sell at a roadside stand. Erect advertising signs far enough away so that motorists may have enough time to slow down and stop. Have a neat stand and arrange the fruit in an attractive manner. Cover the fruit with netting or screen your stand.
6. If you make regular trips to the city you might be able to build up a direct-selling business by going from house to house. You might sell to hucksters who will drive around and sell your fruit direct to housewives.

7. Sometimes it is possible to make a contract with a merchant who will take the entire crop. Your fruit must be of good quality if you are to sell it this way. In some cases canneries will buy your fruit.
8. By joining a growers' association you should be able to sell your fruit at a fair price. Be sure you comply with all requirements of the cooperative association, as they may have standards or rules for grading fruit and packing.
9. Be sure that your family gets to enjoy plenty of fresh fruits, either raw or cooked; they are healthful either way. Preserve fruits in syrup, or as jams, jellies, marmalade, or as pickles. Store late apples and pears for winter use. You can also put up fresh fruit juices for beverage purposes.
10. Apples and pears are about the only fruits commonly stored for winter use. They seem to keep best at a temperature of 34 to 36 degrees. Fruit that is to be stored should not be fully ripe, and must be sound. It is a good plan to wrap each fruit in paper. Oiled paper wrappers are best for apples as they reduce storage-scab development; they also help check the spread of rot.
11. Do not cut asparagus the first year after planting.
12. Pick all forms of green beans as soon as the pods are fairly well filled.
13. Pick beets two inches in diameter for table use.
14. Use cabbage when the heads are solid and filled out.
15. Carrots are best when young. Use medium-sized ones for canning.
16. Pick cucumbers as soon as large enough to use.
17. Use head lettuce as soon as heads are formed, leaf lettuce while young and tender.
18. Pick muskmelons when the stem breaks loose easily.
19. Early onions can be pulled as soon as the bulbs are solid.
20. Parsnips are ready for use in the late fall, but most of them should be left in the ground until spring.
21. Pick peas as soon as pods have filled out.
22. Pick peppers while young and green.
23. Pick sweet corn when ears are full and kernels tender.
24. Use radishes as soon as filled out.
25. Use rhubarb in spring; it gets tough later.

26. Spinach should be used while young.
27. Pick summer squash as soon as ripe.
28. Dig potatoes as soon as vines wilt; let them dry in shade.
29. Dig sweet potatoes before frost; store in a dry warm place.
30. Pick tomatoes when ripe. Pick green ones in fall; let ripen in cellar.
31. Fall turnips are best if pulled after frost.
32. It takes practice to know when to pick watermelons; when in doubt plug them.
33. Store vegetables in unheated cellars.
34. Caves are good for storage of vegetables.
35. Darkness is necessary for storage of most vegetables.
36. Dryness is necessary for onions, sweet potatoes, squash and pumpkins.
37. Potatoes and cabbage keep best in somewhat damp storage

Problems

Inductive

1. Mr. Jack has only made cider from his apples. He has always gathered apples by shaking them down, loading them into a wagon box and hauling them to his big cider press. This fall he wants to sell half of his crop as fresh fruit, and make the other half into cider. How should he handle the apples he wants to sell as fruit?
2. It is a common saying that "An apple a day keeps the doctor away." It is true that apples are healthful. Mrs. Preserve likes to argue and pretends she doesn't know how she may use apples in her home. Point out to her some of the common ways of serving apples.
3. In the fall of the year just after the apples have been picked farmer Cross opens all the doors and windows at night, but he closes them in the day time. Explain why he does this.
4. A farmer told me he had fresh strawberries from his own patch for Christmas dinner last year. How was he able to keep them that long?
5. When Mr. Cooler built his storage cellar he left three ventilation openings to the outside and provided an open container in the room that could be filled with water. Explain why he provided these things.

6. In regard to the harvesting and storing of vegetables, Mr. Mature has been keeping his vegetables by a "trial and error" method. After many years of experimenting, he knows good ways of storing vegetables. What free information can the farmer get and know exactly how vegetables should be stored without the need of experiments?
7. This is the first time Mrs. Storage has raised sweet potatoes. She has a good crop. She does not know whether she should dig them before frost or after it. Give her the information on this point.

Judgment

1. Going back to Mr. Jack, he says he wants to market half of his crop as fresh fruit and half in the form of cider. He could (1) hand pick all the apples and sort them, selling the good apples and making cider out of the rest, or (2) select half of the trees for hand picking for market, and half of the trees for shaking down for cider making. Which method would you advise him to follow and why?
2. Considering everything, which method of direct selling of fruit do you think would be most successful: (1) roadside selling, (2) house to house peddling in a city, (3) selling to merchants by previous arrangements? Why?
3. Jack Banty built his storage cellar with a concrete floor. His neighbor has a cellar with a clay floor. In which of these two cellars will the apples keep better?
4. A farmer picked some of his apples two weeks later than other trees of the same variety in his orchard. He noticed a difference in the size and quality of these two pickings. What do you think was the difference and how do you account for it?
5. A farmer's pear tree blew down during a wind storm in the fall when the tree was loaded with fruit. The pears were full size, but they had not ripened yet. He picked these pears and stored them, and he observed they were better quality than those which were allowed to ripen on the tree. Would it be better to let the fruit ripen before storage or should it be picked just when it reaches maturity in size?
6. Mrs. Ventilation has always stored Irish potatoes in a cool, damp root cellar. She has over three bushels of sweet potatoes this fall, her first crop of this kind. She

wants to know whether she should store them with her Irish potatoes or keep them in a warm, dry room? Which place should she use? Why?

Creative

1. Draw a cross section of an ideal air-cooled storage cellar, which would fit home requirements.
2. List the tools and equipment necessary to harvest your vegetable crops.
3. Prepare a chart on the storage of vegetables showing the names of vegetables, temperatures, degree of humidity, and amount of light.
4. When you harvest vegetables, keep a record of all steps in harvesting and storing them.

Additional Activities

1. Plant an orchard, select location and varieties.
2. Prune (a) new trees (b) five-year-old orchard.
3. Spray for disease and insect enemies.
4. Prune grape vines.

SUB-UNIT II

The Ability to Carry On An Adequate and Profitable Vegetable Program for the Home.

Sub-abilities

A. The ability to choose proper size, location, and soil for the garden.
B. The ability to select and use garden tools that are well adapted to gardening.
C. The ability to control insects and diseases.
D. The ability to harvest and store vegetables.
E. The ability to plant and cultivate vegetable crops.

Sub-ability (A)—The ability to choose the proper size, location and soil for the vegetable garden.

Principles

1. A half acre will usually provide enough vegetables for the average-sized family.
2. Farm families should have both a kitchen and field garden.
3. It is sometimes difficult to get just what is best in location near a home, but a south slope, not too steep, is probably best, since it usually warms up earlier in the spring.

4. Land should be well drained.
5. Slope should not be so steep that it will wash.
6. Light sandy soils are quick, early producers, easily tilled and less subject to packing after rains, but they dry out very rapidly.
7. Heavy clay or loam warms slowly in the spring, packs easily and is hard to till and cultivate, but it usually produces higher yields.
8. Animal manure should be turned under immediately after being applied to the garden.
9. One hundred to 150 pounds of nitrate of soda per acre is a splendid fertilizer for leafy vegetables.
10. Three hundred pounds of superphosphate per acre is an effective fertilizer when used with barnyard manure for root and tuber crops.
11. Hotbeds are very useful and inexpensive.
12. Hotbeds should be located on well-drained soil and have a southern exposure.

Problems

Inductive

1. Mr. Goodneighbor has a field garden which is large enough to supply enough vegetables for two familites like his. He says that gardens are a lot of work but a large garden is not much more work than a small one and he can give a lot of his neighbors vegetables. Is this a good policy for farmers to follow? Why?
2. Mr. Jasper says his potatoes never do very well. Last year he tried solving the problem by liming the potato ground and correcting acidity. However, they proved to be of poorer quality than ever. Was this the proper procedure to take? Why?

Judgment

1. Mr. Rollins is planning to have a field garden. He has his choice of the following soils:
   a. Peat and muck
   b. Light or sandy loams
   c. Heavy or clay loams

   Which should he choose? Why?

2. Mr. I. has a kitchen garden very low in productivity. His wife doesn't want to go to the field after vegetables. He has the following suggestions for increasing fertility of his old garden:
   a. Barnyard manure
   b. Green manure
   c. Commercial fertilizers
   d. Lime
   Which would you advise this man to use? Why?

Creative

1. Bring in a sketch of your proposed garden or gardens you would want on your farm, giving size, location, and soil type.
2. Bring in a plan of fertilizing the soil of your garden, giving amount of fertilizer, kind of fertilizer and time and method of application.

Sub-ability (B)—The ability to select and use garden tools that are well adapted to gardening.

Principles

1. Buy tools that are not too expensive.
2. Buy tools that are not too difficult to operate.
3. Buy tools that are in keeping with the size of the gardening project.
4. Buy tools that are effective from the standpoint of good cultivation.
5. Power cultivators may be used.
6. Hoes and rakes of various kinds adapted to different purposes should be secured.
7. Various types of hand weeders are needed.
8. Hand drills such as the planet junior save much time.
9. Tools must be used often enough to keep weeds from getting a start.
10. Two stakes and a string are helpful in gardening.
11. Straight rows add much to the appearance of a garden.
12. A spatula is essential for transplanting plants.
13. Three types of spades: the spading fork, the straight spade, and the tile spade are a necessary part of garden equipment.
14. Tools should be cleaned and greased after using.

Problems

Inductive

1. Mrs. Putoff planted the home garden, but additional work made it impossible for her to hoe the garden as soon as it should have been done. The rows of carrots, salsify, and beets, as well as the beans and turnips, had many weeds in the row. Mr. Putoff suggested that he use the horse cultivator. His wife agreed. Do you approve of this procedure? Why? Why not?
2. I am living in a German community where many potatoes are grown. Practically all of them are cut and planted by hand. Cultivation is done with a hoe. When digging time comes, many of them are dug with spades, hoes, and some with a plow. Is this a practical economical way to grow potatoes? How would you do it?

Judgment

1. Mrs. Sure always insists on having a small garden at home in which the rows are planted from 12 to 18 inches apart and all cultivation is done by hand. Mr. Sure thinks it takes too much time to do the gardening by hand. He thinks it should be planted in the field in rows, three to three feet six inches apart, where most of the work can be done with power cultivators. With whom do you agree? Why?

Creative

1. I have a garden 100 feet by 120 feet. Make a list of garden tools for the garden, taking into account cost, size of garden, type of crops grown.

Sub-ability (C)—The ability to control insects and diseases.

Principles

1. Handpicking is practiced on larger insects.
2. Destruction of refuse prevents the breeding of large numbers of insects.
3. Community efforts in cleaning up weeds and trash reduce crop pests.
4. Paris green, lead arsenate, calcium arsenate, DDT are common poisons used in killing insects.
5. Sucking insects are controlled by contact poison such as nicotine, pyrethrum, etc.

6. Fall plowing is helpful.
7. Dusts are usually more easily applied than sprays.
8. Arsenical poisons are not recommended for leafy vegetables, which may be eaten before poison is washed off.

Problems

Inductive

1. Mr. C. has moved to a new farm where the garden has been handled very carelessly. Weeds and insects seem to have had control. How would you proceed to improve this gardening program? Why?
2. Mr. Smith has been growing potatoes on the same land for several years. It seems that his vines wilt and die off, and the potatoes are usually small. What would you say is his difficulty?

Judgment

1. Bill is a member of a 4-H club. He has had a gardening project and has been showing his products at the State Fair. He has a well-organized spray program. He seems to get many awards on his vegetables. James is also a member of the same club, but he does not seem to be able to secure many premiums. He says spraying and dusting take too much time and cost too much. With which program do you agree? Why?

Creative

1. Make a list of the most common insects, give their life history and the best method of controlling them.
2. Draw up a chart for spray materials, giving the mixture and time to apply and cost.
3. Make a plan showing the common vegetable plant diseases and the best method of controlling them.

Sub-ability (D)—The ability to harvest and store vegetables.

Principles

1. Potatoes should be stored in a dry, cool place above freezing.
2. Parsnips, cabbage, parsley, horseradish, and salsify should be stored in frozen pits.
3. Complete darkness is necessary for potatoes to be stored and for most other vegetables.
4. Ventilation is useful for cooling or drying.

5. Onions, garlic, sweet potatoes, squash, and pumpkins should be stored in a dry storage place.
6. Humidity may be obtained from damp ceilings, walls, or floors.

Problems

Judgment

1. Mr. Temp has dug all his root crops, except the parsnips. Now the question is, should he take up the parsnips, too, and keep them in the root cellar, or should he leave them in the ground until spring? Why?

Creative

1. Prepare a chart on the storage of vegetables. Show names of vegetables, temperatures, degree of humidity (dry or moist room), amount of light.

Sub-ability (E)—The ability to plant and cultivate vegetable crops.

Principles

1. Hotbeds are very useful and inexpensive.
2. Hotbeds should be located on well-drained soils and have a southern exposure.
3. Electricity is the best source of heat for hotbeds.
4. Buy seed from well known and reliable firms.
5. Plant seeds at a depth four times their diameter.
6. Hotbed or coldframe plants should be transplanted when they are one to two inches high.
7. Transplanting slows up growth and maturity.
8. In transplanting, allow as much soil as possible to adhere to the roots.
9. The holes for the plants should be made just before transplanting to prevent drying out of the soil.
10. Transplanting should be done on a cloudy, rainy day or just before nightfall.
11. Seed thickly to insure good stand, and thin out while plants are small.
12. The vegetable crops should be rotated on different soils in the garden.

Problems

Inductive

1. Mr. Stumped has a kitchen and a field garden. He maintains they both lose him money. He still has to buy his early vegetables at a high price, and by the time his garden is productive he can buy the vegetables cheaper than he can raise them if he takes the labor expense into consideration. Is Mr. Stumped using correct procedure and reasoning?
2. Farmer A. has a hotbed. He takes his plants from the hotbed and transplants as soon as danger from frost is over. He finds, however, that unless he hoes his garden weekly the weeds literally take his plants. What can he do besides cultivating to keep down weeds?

Judgment

1. Mr. Foster wants an earlier producing garden. To have this he must build either a coldframe or a hotbed. Which would you advise him to build? Why?
2. Mr. Agan has his choice of buying seed from local grocery stores or of ordering from large seed and nursery companies. Should he purchase his seed from these larger concerns or from local dealers? Why?
3. Mr. Jedele has a good-sized garden for a family of six. He would like to know whether it is better to sow his seed thick and later on do some thinning out or to sow the seed thin enough that it will require no thinning out. Which would you advise him to do?

Creative

1. Bring in a diagramatic sketch of a garden plan for your family. Show the distance between rows and length of row for each vegetable; place an order for the seed.
2. Bring in a plan for raising potatoes on your farm. List all procedures, the time each is made, and equipment necessary.

Additional Activities

1. Plan the home garden.
2. Set bed of strawberries.
3. Treat seed potatoes with fungacide.
4. Cut seed potatoes according to recommended sizes.
5. Arrange for demonstrations on freezing, canning, dehydrating, and storing vegetables.

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UNIT VI. BEAUTIFYING THE HOME GROUNDS

INTRODUCTION

Landscaping is the art of creating beauty by means of plants and other materials found outdoors. Whether they live in town or country the first concern of people after they grow up is to make a living. We must all have a place to live, something to eat, and clothes to wear. But after these things have been attained, man seeks further after beauty.

Iowa with its fertile soil and rolling hills is particularly adapted to the beauty of the out-of-doors. But we do not know instinctively how to create or even to appreciate this beauty. We must learn it as we learn everything else. To accomplish this then is the purpose of the landscaping unit in the course in Agriculture.

GENERAL OBJECTIVES

1. To develop the point of view that life either on the farm or in town becomes more complete and happy when carried on in an environment of natural beauty.
2. To develop a knowledge of the different kinds of plants and the materials which are used in landscaping.
3. To teach how to arrange plants and the materials effectively in a landscape plan.
4. To teach such information pertaining to the culture of plants as will enable the individual to plant and care for the materials called for in a landscape plan.

SPECIFIC OBJECTIVES

1. An interest in landscaping.
2. The ideal of developing beautiful home grounds.
3. Some abilities in planning, planting, and caring for the home grounds.

SUB-UNIT I

The Ability to Plan, Plant, and Care for the Home Grounds.

Sub-abilities

A. The ability to plant and care for a lawn.

B. The ability to recognize the different kinds of trees suitable for landscape work, and to know where to plant them and how to care for them.

C. The ability to recognize the common shrubs used in landscaping, and to know where to plant them and how to care for them.
D. The ability to recognize the more common garden flowers, and to know where to plant them and how to take care of them.

Sub-ability (A)—The ability to plant and care for a lawn.

Principles

1. The lawn is like a green rug forming the background of a landscape plan upon which all other plantings are arranged.
2. Good drainage for a lawn may be obtained by having a gentle slope away from the house.
3. Terraces are unnatural in nature but are sometimes necessary if the lay of the land is such as to demand it.
4. If the soil is poor, animal manure may be worked into the top layer.
5. Grass likes sweet soil, and if a test shows the soil is sour, an application of lime will help.
6. One good grass mixture consists of 60 per cent blue grass; 20 per cent red top; 10 per cent white clover; and 10 per cent rye grass.
7. One pound of this mixture to 200 square feet is sufficient.
8. The best time to plant grass seed is early in September. Early spring is also a good time.
9. After sowing, the seed is raked in, rolled, and then watered.
10. The mower should be set a bit high for the first cutting and the clippings allowed to remain for a mulch.
11. Grass likes moisture and a good watering once a week in dry weather is better than frequent shallow watering.
12. Weeds in the lawn, such as dandelions and plantain, may be controlled by some of the new sprays, such as 2-4-D.

Problems

1. The grass on a high school football field was not doing well. The caretaker noticed that every five yards across the field where lime had been used to mark the lines the grass was greener and more luxuriant. What was wrong with the soil?

2. Along the east side of a newly prepared football field is a clay bank, quite steep. Which would be better to get grass on this bank, to use sod or seed? Why?
3. A newly married G. I. has purchased a home with a front yard of bare clay. Which would be better to get grass on this yard, to spade in manure or to cover the ground with black dirt?
4. Suppose you have no roller for your grass. A new one costs $22.50, but you can make one yourself for $3.00. How would you go at it?

References

1. Planting and Care of Lawns—U. S. Dept. of Agriculture—Bulletin 1677.
2. Lawn Making—F. F. Rockwell—Ladies Home Journal—Philadelphia.
3. Beautiful Lawns—Firestone Tire and Rubber Co.
4. Farm Home Planting—I. S. C.—Ames.
5. Beautifying the Farmstead—U. S. Dept. of Agr.—Bulletin No. 1087.
6. Lawn Care—O. M. Scott Co.—Marysville, Ohio.

Sub-ability (B)—The ability to recognize the different kinds of trees suitable for landscape work and to know where to plant them and how to care for them.

Principles

1. All trees are divided into two main groups; evergreens, which are native to mountain country, and deciduous or broadleaf trees which grow best in the valleys.
2. The three main families of broadleaf trees are the oaks, the elms, and the maples. Others suitable for landscape work are the basswood, linden, sycamore, hackberry, and ash.
3. Oaks are slow growers but are long lived, well shaped and do not break easily. The red oak and the pin oak are the two fastest growing of the oaks.
4. The white elm is a tall, stately tree which grows quite rapidly and may best be planted along streets in the parkings. It is subject to canker worms and forms crotches which break easily.
5. Three other good trees for street planting in Iowa are the sycamore, hard maple, and hackberry.

6. Three good trees for a front yard are the basswood, the pin oak, and the white ash.
7. Some good ornamental trees for the backyard are the weeping willow, red-leaved maple, Hopi Flowering Crab, and the Red Bud.
8. Evergreens because of their shape and sombre effect are well adapted to parks, cemeteries, and large open spaces. Low growing evergreens such as junipers and yews, can be used as foundation plantings for formal style houses and as backgrounds for rock gardens, pools, and cemetery plantings.
9. Trees may be planted in the fall after a killing frost has sent the sap into the ground or in early spring.
10. Trees in a street parking should go 50 feet apart, with not more than two in the front yard or three in the back yard of the average city lot.
11. The secret of successful tree planting is to firm the soil around the roots leaving no air pockets in the ground.
12. Pruning trees is much like caring for one's teeth in that attention given once or twice a year is better than waiting until serious trouble has developed.

Problems

1. In a new residential section of a large city in Iowa, Carolina Poplar trees were planted along the street. Now after some thirty years these trees are proving to be a nuisance and are being removed. Which trees would wise city planning have recommended? Why?
2. A man planted three American elms in his back yard. They developed into beautiful trees but have become so big and make so much shade that it is most difficult to grow flowers or shrubs in the backyard. Which trees would have served the purpose better?
3. Plan the number, kind, and location of trees either for a farmstead or a home in town.
4. Prepare a chart on "Trees," giving use, good points, and bad points on each of the following: red oak, pin oak, white oak, hard maple, soft maple, white elm, Chinese elm, hackberry, sycamore, tulip, basswood, cottonwood, box elder, red leaved maple, weeping willow, Hopi flowering crab, May day, flowering plum, white pine, Scotch

pine, red pine, Norway spruce, blue spruce, pfitzer juniper, Japanese yew.

Sub-ability (C)—The ability to recognize the common shrubs used in landscaping, and to know where to plant them and how to care for them.

Principles

1. Shrubs for landscape purposes may be divided into three groups: hedge shrubs, ornamental shrubs, and climbing vines.
2. Hedge shrubs serve as a boundary or fence around a property.
3. Two good shrubs for the front yard are Amur river privet and Japanese barberry. For the back yard bridal wreath, honeysuckle and Russian mulberry are excellent.
4. Ornamental shrubs are used to fill in corners of the yard and to tie the house and other buildings to the ground.
5. Tall shrubs are used at the corners, the entrance, and the windows.
6. More judgment is needed in planning ornamental shrubs than hedge shrubs because height of shrubs, time of bloom, and color of bloom must all be considered.
7. Climbing vines are used to cover trellises and fences and are placed at the corners of a house where an ordinary shrub would be too large.
8. Hedge shrubs are planted close together to produce a mass effect, whereas ornamentals are pruned so as to retain their natural shape.
9. Hedge shrubs likewise are pruned to give a mass effect, whereas ornamentals are pruned so as to retain their natural shape.

Problems

1. Some people buy shrubs by getting ten of this and six of that and a dozen of something else, and then try when they get home to find a place for everything. What would be a better way to go about buying shrubs?
2. The janitor of a church bought some shrubs and planted them one bunch after another about a foot away from the building with no regard to the architecture of the church. Now that they are large they all lean away from the building. How could this method have been improved upon?

3. Plan the number, kind, location, and price of shrubs for a farmstead, country school grounds, or home in town.
4. Prepare a chart on hedge shrubs, giving size, type of foliage and fruit, and special use of each of the following: Japanese barberry. Amur river privet, honeysuckle, Russian mulberry, and spirea Van Houettei.
5. Prepare a chart on ornamental shrubs, giving size, color of bloom, time of bloom, and special use of each of the following: flowering almond, forsythia, hydrangea, P. G., waterer, weigela, flowering quince, hydrangea, A.G., French lilac, snowberg, spirea Anthony, and cotonester.
6. Show by diagrams the right and wrong way to prune a shrub.
7. Prepare a chart on hardy, climbing vines, describing leaves, flowers, and fruit, and giving any special use of each of the following: Boston ivy, trumpet vine, clematis, bittersweet, woodbine, wisteria.
8. Pass identification test on Our Common Shrubs.

References

1. Nursery Catalogues
2. Farm Home Plantings—I. S. C., Ames.
3. The Book of Shrubs—Alfred C. Hottes—The A. T. De la Mare Co., Inc., N. Y. City.

Sub-ability (D)—The ability to recognize the more common garden flowers, and to know where to plant them and how to care for them.

Principles

1. Flowers in the landscape picture provide color.
2. The place for flowers in the home grounds is in the backyard between the grassy carpet in the middle and the green wall of shrubbery around the outside.
3. Flowers are not planted in rows like radishes but in irregular beds to furnish masses of color. Exceptions would be in the case of flowers such as gladioli which are grown for cutting.
4. Flowers are planned to give color in as great a variety and over as long a period of time as possible during the growing season.
5. The same soil requirements and insect control measures are needed for flowers as for other plants in the garden.

Problems

1. One town in Iowa is known for its tulips which attract people from far and wide while they are in bloom. Appraise this custom from a landscape point of view.
2. An operator of a filling station has four old tires in front of his place of business lying on the ground with soil in the middle in which flowers are growing. Is this correct procedure from a landscaping angle?
3. Prepare a plan for flowers for a farmstead or for a home in town which you would like to have some day.
4. Prepare a chart on "Perennial Flowers," giving height, time of bloom, color of bloom, and use of each of the following: iris, peonies, delphiniums, phlox, columbine, baby's breath, sweet williams, shasta daises, gaillardia, coreopsis, platycodon, lilies of the valley, foxglove, canterbury bells, chrysanthemums, bleeding hearts, ferns, lupines, pyrethrum, sedum, tritoma, yucca.
5. Prepare chart on "Annual Flowers," giving use, height, time of bloom, and color of bloom of each of the following: cosmos, summer cypress, corn flower, larkspur, scabiosa, strawflower, coxcomb, marigold, balsam, poppy, four o'clock, stocks, calendula, candy tuft, annual phlox, pinks, petunia, ageratum, nasturtium, pansies, portulaca, verbena, sweet alyssum, snapdragon and zinnias.
6. Prepare a chart on "Bulbs," stating when to plant, depth to plant, and special use of each of the following: crocus, snowdrops, scillas, narcissus, daffodils, hyacinths, tulips, lilies, gladioli, dahlias, cannas, callos.

Additional Activities

1. Landscape a property for someone in the community, planting shrubs and trees and seeding the lawn.
2. Grow an indoor window box of house plants for class members.

References

1. Seed Catalogues.
2. *Ten Important Points in Planning your Landscaping*, Helen Field Fisher.
3. Leaflet from Better Homes & Gardens and the Ladies' Home Journal.
4. *The Book of Perennials*—Alfred C. Hottes—The A. T. De la Mare Co., N. Y. City.
5. *The Book of Annuals*—Alfred C. Hottes.

Additional General Activities

The following general activities are intended to enrich the course and are to be used if time permits. They may be used in the place of some of the problems or activities suggested under the various units.

A. Make a scrapbook of pictures and clippings on farming.
B. Make oral reports on farm magazine articles.
C. Place live insect specimens in cage which has been treated with D.D.T. to observe results.
D. Demonstrate osmosis with egg membrane or a carrot root.
E. Photosynthesis demonstration.
F. Collect economic insects, label and learn about their control.
G. Collect and learn to identify numerous crop and weed seed samples.
H. Make a check of a farm for safety hazards.
I. Make a check of a farm for fire hazards.
J. Conduct a feeding demonstration using white rats, rabbits, or chickens.
K. Make a collection of farm magazines.
L. Order U.S.D.A. and State Agricultural College bulletins.
M. Visit a farm using electricity, checking ways used and noting benefits.
N. Visit a farm implement store and arrange for demonstrations.
O. Assist with agriculture exhibit at community fair or harvest festival.
P. Visit a farm woodlot and identify varieties of trees.
Q. Plant trees on school grounds.
R. Dramatize a corn husking bee, a barn warming, or a pioneer family.
S. Make a farm machinery booklet with pioneer and up-to-date sections.