Yes, modern conservation practices soon begin to repay their cost—enable farmers to eat their cake and have it, too. Controlling erosion helps to hold precious topsoil on the land and, at the same time, hoists farming profits.

Contouring, terracing, strip-cropping, and other soil-saving operations, which can be practiced with regular John Deere farm equipment, mend mismanaged or erosion-scarred land. Grasses and legumes, together with agricultural limestone and commercial fertilizers, rebuild soil productivity in a hurry. This double-barreled program, recommended by agricultural authorities, enables soil conservation farmers to improve their places and, at the same time, raise bigger yields and enjoy better incomes than ever before.

Soil conservation, however, is more than a remedy for ailing acres or a recipe for bigger profits. It’s a gilt-edged investment in America. By making our agriculture more stable and productive, modern soil conservation practices help to maintain our economic well-being and safeguard our national security.
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PROGRESSIVE MACHINE WORKS — ANDERSON, S. C.
An Ag Student’s Day
At Clemson

This issue, The Agrarian has decided, for the interest of its readers, to present a picture story portraying a typical day in the life of a Clemson agricultural student. The Agrarian has selected as a representative student Mr. Winston Sibley of Greenville, South Carolina. Winston is a senior this year and is majoring in Animal Husbandry.

He has proved himself an outstanding student during his four years at Clemson. His scholastic record is excellent and he is a member of both Phi Eta Sigma and Phi Kappa Phi. In addition to this superlative scholastic achievements, Winston has given his time and service gladly both to the School of Agriculture where he is a member of Alpha Zeta, and to Student Government in which he is a class representative in the student assembly.

During his study at Clemson, Winston has received many honors. Last year, he was awarded the Danforth Fellowship Scholarship. Last summer he attended Mr. Danforth's Leadership Camp in Shelby, Michigan. This year he was awarded The Borden Company Foundation.

The Agrarian feels that Mr. Winston Sibley has been, as a student, an asset to his major and to this College, and it feels that he will maintain, after his graduation, the good name and traditions of Clemson College.
Early in the morning, Winston Sibley leaves for the campus to start another school day at Clemson.

After reaching the campus, Winston stops at Klutz’s before he starts the routine of daily classes.

After morning classes, Winston spends the first part of the afternoon in Meats Lab.
Now for a relaxing, late afternoon of golf. Winston will probably finish with broken clubs, lost balls, and black thoughts.

The end of a long, full day, and Winston settles down to prepare himself for tomorrow’s classes.
One of Darwin’s principles was that all plants and animals reproduce faster than their subsistence, or in other words, that living organisms multiply faster than do their sources of food. As long as there are just a few living organisms of a species, everything is fine and the organism can find food; but as time goes on, population of that organism keeps increasing until there is competition for food, a constant struggle for life, and a survival of the fittest resulting from this struggle.

It may seem old-fashioned to go back to Darwin, whose work was published in 1850, but I believe that this principle of population overtaking food supply is definitely true, and it is a thing that is extremely important, it is a thing that is quite disregarded, and it is a thing that is applicable to man as well as to other organisms.

Food! No one can measure the battles that have been fought or the misery that has been suffered because of a lack of it. And going back to our principle, the cause of this is generally too much population for the land area to support. To put it another way, if an acre of land will support only one man and the population multiplies so that two must live on that acre, there’s going to be trouble.

China was a great power centuries ago. Today she has millions in poverty trying to make a living out of an area of land that hardly produces food enough to support half that population.

India is in the same boat. Poor land combined with too many people makes for little hope for them. The newspapers today tell of her desire for some 2 million bushels of grain from some outside source.

Japan is now having a terrific food shortage. It is estimated that by 1960 she will have a 25% deficit of food and that she will never again be self-sustaining because of her population increase.

Palestine, Egypt—all of these old countries were once great powers and today are faced with poverty and hunger. Darwin’s principle got them first, because they were the first to be inhabited by man; now let’s see what it’s done to Europe.

As early man learned how to combat the cold weather of northern winters, he moved upward into lower European countries and settled there. Since there was an abundance of resources (which in the long run means food) and since the colder climates produce active races, the powerful empires such as the Romans and the Greeks emerged. Today both of these countries are dependent upon the United States for food.

The great Roman Empire is today a bunch of crowded, hungry Italians. Mussolini went down in Ethiopia in 1939 to get food and more land for Italy. There are simply not enough Italian acres to support the Italians.

Practically all of Europe today is hungry—or would be if we weren’t feeding them. Despite the war, Europe today has millions more than she has ever had.

It is getting them all. The mighty British today are on a worse diet than many European neighbors. Why? It is because their country is only 50% self-sustaining, and they have to import much of their food at high prices. England’s meat shortage today is more than a meat shortage—it is a land shortage. There are over twice as many cattle per capita in the U. S. than there are per capita in the British Isles. If it were not for her possessions, England as a power would be washed up.

The Black Plague, the venereal disease brought back by Columbus’s men, and the numerous wars have cut Europe’s population in half at times, but Darwin’s principle of population over subsistence has kept creeping on.

For those of you who would send all of our food and natural resources to the poor, hungry, freedom-loving countries of the world, let me go on with my story.

In the late 15th century, man was able to conquer the great oceans, and thus in a few years pilgrims from Europe began to settle in the unknown land to the west. This country, the U. S., has had prosperity in her early years (and we must remember that she is not yet 200 years old)—prosperity even greater than the early Empires of China, Egypt, Rome, Greece, etc.; for besides having an abundance of natural resources to draw upon, she has had a democratic government, free enterprise, and modern science to further her.

But let’s remember that I said the country is young and let’s not forget Darwin. Have you ever thought that America’s resources someday may not produce enough food to support a huge population—that there’s a limit to the amount of food that an acre of land can produce?

America’s birthrate today is 165% that of her deathrate. The United States has grown from 5.5 million people to 150 million in the last 50 years.

(Continued on Page 30)
Healthy fields mean profitable yields! One good way to get the most out of seed and labor is through a sound program of insect control with toxaphene insecticides. Approved by the U.S.D.A. for grasshoppers, and by leading cotton-growing states for the control of all important cotton pests, low-cost toxaphene dusts and sprays are also being used effectively against an increasing variety of insects that attack other crops. This collection of books on insect control includes detailed recommendations on specific insects and a summary of latest federal or state recommendations. Write today for your free copies.

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MAY 1951
Agriculture Meets Industry

ALAN SIBLEY
Agronomy ’51

South Carolinians were taken aback by the news that the H-bomb plant was to be located at Ellenton and surrounding territory. Immediately raised was the question of why such a plant was to be located within the state.

Of course, the solution lay in the fact that the Savannah River provided the abundant water power needed.

South Carolina has a great industrial potential, and the recent expansion of factories in the South bears this out. But why has this potential remained dormant for so long, and what will its development mean to a state that has been predominantly agricultural?

From its beginning South Carolina has been an agricultural state, and the abundant rainfall, which now attracts industry, was looked upon as a blessing for the farmer rather than the industrialist.

Many of the New England settlers in America were actually looking for a shorter route to the Far East in hopes of establishing trade monopolies. Once in America a large number of these early settlers turned to local trading as a livelihood, but these colonies often failed, for too much time was devoted to trading and not enough to agriculture and the food supply.

It was, then, natural that the South looked attractive to the colonists, for with plenty of sunshine and water the food problem was lessened.

The first cattle “ranches” were established in the Carolinas and Georgia. The Piedmont section of these states, then, had the first real cowboys. Large shipments of beef and other livestock products were made from these colonies to the West Indies during the latter half of the eighteenth century. The invention of the cotton gin in 1795 caused an increase in cotton production that forced cotton in and forced beef cattle out of the Piedmont. A strong export demand and the availability of slave labor caused cotton to stick. Large acreages were devoted to the production of rice and indigo.

Charleston at one time was the second most prosperous city in the Union being second only to New York; hence, South Carolina was satisfied with its agricultural life, and industry was left for the northern states to develop.

Conditions were not static, however, and the position of South Carolina as a prosperous state was threatened. Continuous row-cropping caused the soil to erode. The slavery question threatened the farmers, for the slaves were considered as property and like all property had value; thus, the freeing of the slaves would mean the losing of property and the lessening of wealth.

Also, the northern states were in favor of tariffs as protection.

(Continued on Page 31)
The farmer anxiously watches the weather as he keeps his combine operating every hour possible in hopes of completing the grain harvest before the expected storm arrives. Presto! all of a sudden one small part snaps, rendering the combine useless. The nearest repair shop is too distant to be of any immediate aid to him, and the ordering of a new replacement part is entirely out of the question. With no other equipment available with which to complete the harvest, the farmer watches helplessly as the sky darkens and the storm approaches. This untimely delay causes him to stand a good chance of losing both his grain crop and his religion.

If only this farmer had had a welding outfit, he could have possibly saved himself quite a sum of money, as well as the wear and tear on his nerves. With a quick repair of that one, seemingly insignificant part, he could easily have saved enough money to pay for the welder, in addition to all the other uses to which welding may be applied on the modern mechanized farm.

Such an example as the above may seem to be on the extreme side of the picture, but it is only one of countless instances in which welding may be put to a practical use on farms of today. At the present time, more and more machine-minded farmers are seeing the need for welding in their program of mechanization, and it is very important to note that welding is paying its way on the farms of these men.

In the not too distant past, a welding unit was considered to be a luxury item when thought of in terms of farm use. Such an article of extravagance was considered as somewhat of a toy only for the use of the rich farmer who liked to tinker with tools for a hobby. However, the picture has greatly changed in recent years. The manufacturers of welding equipment now offer to the farmer well-built, economical welding units especially adapted for use on the farm. These manufacturers have recognized the fact, just as have many of the more progressive farmers, that welding definitely has an important job to fill on the farm.

Probably the most important of the services which are performed on the farm by welding is the repair of broken machine parts, which, if not promptly repaired, may cause costly losses of time as brought out in the example of the grain farmer. However, there are many other ways in which welding may be used on the farm, each of which may save the farmer much time and money. Worn plow shares may be used again if metal is deposited with a welder on the worn portion and then resharpened. Worn axles may also have their lives lengthened by building up weld metal in the worn sections and then smoothing with a grinding wheel. If the welder is a gas operated type, it may be used to heat tools or any metal pieces for easy bending or forging. These are just a few of the uses for a farm welder, but there are numerous other practical uses which present themselves as necessity arises. As is usually the case, the farmer himself recognizes the needs if he has a welding unit and, with his own ingenuity, is able to devise many new uses for his welder.

An important decision which the farmer has to make when he decides to purchase a welder is to determine which type to buy. The two most commonly used types of welders are the oxyacetylene welder and the electric arc welder. There are several factors to be considered in selecting between the two, such as the availability and relative cheapness of electricity versus oxygen and acetylene gases, the original cost of the equipment, and the use to which the welder is to be put. After this selection is made, the farmer must then decide on the size welder which will be most practical for him to purchase. The specifications of the manufacturer will be very helpful in making this decision.

Many farmers balk at the idea of buying any kind of welding equipment because of the mistaken idea that welding is a complicated, dangerous operation. On the contrary, welding is relatively simple with the many easy-to-follow handbooks on the subject which are now available, and the manufacturer furnishes further instructions as to the method of doing practically any normal welding operation. It is now possible for the farmer to take advantage of the benefits to be derived from the ownership of a welding unit with very little instruction. He can save large amounts of time and money, plus gaining the feeling of satisfaction which comes to a man who has done a constructive piece of work. Who knows? He might even become one of those men who stay up late at night constructing some piece of equipment to his own specifications or devising some invention of his own.
PUREBRED

VERSUS

CROSSBRED

Crossbred Calves Compete with
Purebred Angus Calves

By JEAN ANDRE ROUX
Animal Husbandry '52

In 1947, a group of purebred Angus cows were selected from our Coast Experiment Station Station at Summerville, S. C. These cows were selected to produce purebred and crossbred calves for a test. The main purpose of this test was to compare purebred Angus calves and crossbred Brahman-Angus calves grown under normal conditions for the production of “Heavy Calves” for slaughter. The cows were divided into two groups, one group was bred to a purebred Brahman bull. The object was to produce late winter and spring calves that could be creep-fed and run on pasture with their dams. These calves were fed a ration of four parts ground corn, two parts ground oats, and one part cottonseed meal. A mineral mixture was provided in a self feeding manner. The possibility of all the good dams being in one lot was eliminated by switching the cows to opposite bulls during the second and following years. A Hereford bull was secured in 1947 and the cows were divided into three lots. All the calves were weighed at birth and again when they were weaned at seven months of age. After weaning, the calves were shipped by truck to a packing plant about fifty miles from the station. At the plant, they were slaughtered and processed; also their dressing percentage, grades, and shrinkage due to shipping were noted. A committee of three graded the calves.

The following three years data was based on averages per calf.

The purebred Angus calves weighed 65.2 lbs at birth, 461.0 lbs at final weighing, and dressed out at 56.6 lbs. While the Brahman-Angus crossbred calves weighed 79.4 lbs at birth, 506.8 lbs at final weighing and dressed out at 58.3 lbs. Both the purebred Angus and crossbred Brahman-Angus had carcass grades of Low Good.

By comparing the above data we find that the Angus calves were smaller at birth, at weaning, and had lower gains. The crossbreds had 45.8 lbs more meat for sale per calf (each 25 cents gives $1.13). The difference in dressing percentage was 1.7 percent in favor of the crossbreds. Shipping loss and feed were not kept for the first year. The crossbreds consumed a larger amount of feed than the purebreds; however, at market price they paid for the extra feed and gave a profit of $5.17 more than the purebreds.

A Hereford-Angus cross was now added to the test. One year's data shows that the Hereford-Angus crossbred calves weighed less than the Brahman-Angus at birth but more than the purebred Angus. However, the Hereford-Angus calves gained more than either the purebred Angus or the crossbred Brahman-Angus calves. The final weight of the Angus was 474.8 pounds, the Brahman-Angus weighed 523.9 pounds and the Hereford-Angus weighed 551.1 pounds at the final weighing. A dressing percentage of 58.1 and 58.8 was recorded for the purebred Angus and the Brahman-Angus crossbred calves respectively. While the Hereford-Angus calves dressing percentage topped both the purebred Angus and Brahman-Angus crossbred calves with a 59.3 percentage. A carcass grade of Medium Good for the Hereford-Angus calves also topped the carcass grades of Low Good of the purebred Angus and Brahman-Angus crossbred calves.

For the one year the Hereford-Angus crossbred calves were on test they out-weighed both the Angus and the Brahman-Angus at weaning and had a higher gain. They consumed more feed; however, their extra weight and higher carcass grade gave them enough margin to pay for the feed. The Hereford-Angus calves also had less shipping loss and a higher dressing percentage. Through three years work the Brahman-Angus crossbreds have shown to be consistently heavier, dress higher, and have equal carcass grades to the purebreds; however, the one year data of the Hereford-Angus calves has shown them to be equal to or better than the Brahman-Angus crossbreds. Hybrid vigor is believed to be accountable for the increased gain of the crossbreds, also equal hybrid vigor was found in the offspring of the Hereford bull when they were crossed with comparable Angus cattle. Thus, for commercial use the crossbreds show promise of being more profitable than the purebreds.
How many farmers realize that conservation practices not only save soil but also increase yields and reduce crop production costs? A majority of farm paper editors . . . regional and national . . . answering this question said that nearly 100 percent realize it but, for various reasons, most do not yet practice it.

Here is your challenge as farm leaders of the dawning decade: To transform this apathetic acceptance of soil conservation—wherever you find it—into dynamic guidance of prevailing farm practice. It calls for the fire of youth, the energy of persistent purpose, to overcome habits and wasteful ways.

In this service to agriculture and to America, the farm machinery industry is your ally. For example, Case has consistently promoted the principle that conservation is not something to be done for the farmer but rather to be his own way of farming with his own farm power and implements, at his own discretion and responsibility.

With its 15-foot working width, the Case wide-cut disk harrow gives great capacity with tractors of medium size, such as the Case full 2-plow "SC" shown here with adjustable front axle. Outer sections of this harrow swing on inclined pivots. They can be carried above the middle gangs to go through 12-foot gates, or to gain extra penetration when used as 10 1/2-foot harrow. Angling and straightening "on the go"—by hydraulic control or by rope control powered by its own gangs—makes it easy to cross grassed waterways without cutting and without loss of time. J. I. Case Co., Racine, Wis.
Fruit plants may be propagated in two general ways: By seeds (sexually) and by vegetative propagation (asexually). As a rule, the use of seeds in the propagation of fruit varieties, though simple and economical, is not satisfactory; the seedlings produced are usually different from the parents, especially in size, shape, and quality of fruit. Fruit varieties that would come reasonably true from seeds could be obtained by selection and breeding over several generations, but that would require a number of years. The fruit-plant propagator, then must use a vegetative method (asexual). That is, he must root some part of the parent plant, such as stem or root (cuttings, layering, and similar processes), or place a part of one plant on another in such a way that it will grow (grafting and budding). Since a portion of the parent plant is simply growing in a different location, a plant propagated by asexual means will ordinarily be identical with the parent.

Placing a piece of branch—a section a few inches long—in soil or in sand so that it will root and form new branches is not difficult or expensive. This method—propagation by cuttings—is used for figs, pomegranates, grapes, and certain other fruits and ornamentals. Unfortunately some of the principal tree fruits (for example, pears, apples, peaches, and walnuts) will not form roots at all by means of cuttings or similar methods, or so few roots will grow that the practice cannot be followed commercially. These plants, therefore, are usually propagated by first growing seedlings and then budding or grafting the desired variety upon them. Such seedlings are uniform enough for this purpose, but vegetatively propagated plants are sometimes used to secure disease resistance and uniform vigor. The plants upon which fruit varieties are budded or grafted are called rootstocks.

There are many different types of cuttings, but the one most commonly used in propagated fruits is the simple hardwood cutting. Figs are readily propagated from hardwood cuttings. They are made during the dormant season from well-matured wood of the previous season's growth. The cuttings should be 6 to 9 inches long, and the basal cut should be just below a bud, as it is from this position on the stem that roots arise most readily. If the cuttings are made in the fall or early winter, they will have to be stored in moist sand or moss in a cool place until spring. If made in late winter or early spring, they may be planted directly into the nursery row. Plant 3 to 6 inches apart and leave only one bud above the soil. Press the soil firmly around the base of the cuttings. Figs may also be propagated by layering when there are shoots that can be pulled down and covered at intervals with soil.

Most bunch grapes can be propagated readily from hardwood cuttings. They are made and treated very similar to fig cuttings. It is also easy to graft or bud one variety on another.

Muscadines (including the Suppernong variety) root very poorly from cuttings and do best when propagated by layers. To make layers, take a cane and cover a portion of it with soil in the summer and it will root by next spring, after which it can be removed and planted. Long canes may be covered at different locations if branches are present these also may be covered.

The roots of blackberries live for many years, but the canes live only 2 years. These canes sprout each spring from crowns, and suckers come from roots at various distances from the parent plant. Plenty of new plants can be usually obtained by digging these suckers up in the following winter. Another method is to dig roots 1/4 inch or more in diameter in the winter or early spring, cut these roots into pieces 3 to 4 inches long and place horizontally in trenches about 3 inches deep. These will sprout and by fall should become strong plants with good root systems.

The dewberry, boysenberry and youngberry are propagated by tip layering. In September the tip of the cane is covered with soil, and it will root in a short time. A bud or crown forms which will produce a new plant. These rooted tips are cut off in the spring and planted.

Strawberries are propagated from runners. The runners take root at the nodes forming a new plant.

A grafted tree is made by the union of two parts—the scion, which is cut from a twig of the variety desired from which the top is to be developed, and the rootstock, which is usually of the same species or a closely related one, from which the root system is to be developed. It is essential that the cambium layer of the scion and stock be in contact. The cambium layer is the thin layer of cells between the wood and the bark from which new tissues are developed.

In the past, rootstocks for apples have been grown to a great extent from "French Crab" seed, obtained mostly from France. In recent years, however, seed of domestic commercial varieties have been utilized for rootstocks. The most commonly used varieties are Rome Beauty, Delicious, Ben Davis, and Winesap.

These rootstocks may be home grown or purchased from almost all large nurseries.

Scion wood of one season's growth is preferable to older wood because unions with it are more easily made and the buds are more likely to grow. Scion wood may be taken from bearing trees of the desired variety or purchased from nurseries. Scion wood is usually cut in late fall, or during winter. It should be labeled and stored in a cool
place and kept moist. The tender tips should be cut off before use.

Grafting of this type is also referred to as “tongue” or root grafting, and is used in grafting seedling root stocks for growing young fruit trees, usually apple or pear varieties. In top working small trees where it is undesirable to graft in the trunk and the limbs are an inch or less in diameter then whip grafting is easily used.

Best results are obtained when the scion and stock are of about equal size. In making a whip graft, a long tapering cut about 1 1/2 inches long is made on both the scion and the stock. One cut with a sharp knife will do it. The knife is then placed on the slope or slant about half way from the end and a tongue is cut here on both scion and stock. A straight draw cut should be made avoiding a split. When the scion and stock are brought together, the tongues each slip into the slits made for them and are held together. If the scion and stock are of equal size (the cambium layers will be in contact. If they are of unequal size then the scion should be offset so that the bark matches on one side. This type of graft is usually wrapped or tied to hold the scion and stock together until the cut is healed. Waxed string, raffia, small rubber strips, and special tapes are used for this purpose. Narrow rubber strips about five inches long are ideal, for they exert enough pressure to keep the parts together and will allow for expansion. After wrapping, the graft may be covered with a thin layer of wax. The graft should be examined in about six weeks and if the cut has healed then remove the wrapping.

Immediately after the grafts are made they should be tied in bundles and packed in moss, sand or sawdust to keep them moist. These grafts should be stored in temperatures of 40° to 45°F. The grafts are planted in nursery rows in early spring while still dormant. They are usually spaced 6-8 inches apart. Care is taken that the union and most of the length of the scion is underground. The soil should be pressed firmly around the roots without disturbing the union.

The peach is propagated almost entirely on peach seedlings grown from seed of commercial varieties.

Budding is employed by nurserymen in propagating a desired variety of peach on a seedling stock. Budding differs from grafting in the use of a single bud instead of a scion and also in the season of the year when the operation is performed. Budding is done in the summer while growth is active.

The pits are planted in the fall or early spring in rows where the young trees are to be budded because they obtain sufficient size to be budded during the first year’s growth. At budding time (last of May or June) the stems are about pencil size, and the lower leaves are removed so that the buds can be placed on smooth, clean stems.

The buds are taken from wood of the current season, after growth has progressed so that those on the middleportion of the twigs or “bud sticks” have fully developed. Generally, the four or five buds along the middle portion of the twig are best to use.

At the time the bud sticks are cut, the leaves are trimmed off, leaving about a quarter of an inch of leaf stem to protect the bud and to aid in handling. It is advisable to cut the buds at the time they are used, but if necessary they can be kept fresh for two or three days wrapped in wet burlap or paper and stored in a cool place.

The “T” or shield budding with modifications is the most widely used method of cutting. The bud is cut from the twig in the form of a shield. The bud is inserted into a cut under the bark of the stock made by two cuts—one along the stem, the other across it. The operation is completed by tying the bud in place. Several different materials are used, for example, string, cloth, raffia, and rubber strips. The wrap is allowed to remain until the tissues have united, but should be cut if girdling takes place, about 10 days to month. Ordinarily the buds will remain dormant the season they are inserted.
Are Chemical Fertilizers Really Harmful?

By ALAN B. SIBLEY

Agronomy '51

In recent years a new cult of agriculturists has appeared. These agriculturists go by the title of Organiculturists, or "organic farmers" or by some other name which implies that the farm without the use of water-soluble commercial fertilizers and fertilize their crops solely with such materials as green manures, animal manures, tankage, fishmeal, composts and minerals in the ground rock form. These organic farmers have become rather numerous, and are publishing their own literature. Much of this literature is sound, for all agriculturists realize that organic matter is a valuable constituent of all soils; however, the Organiculturists are not satisfied in telling other agriculturists the value of organic matter, for they are publishing pamphlets and magazines which unfairly picture chemical fertilizers as being detrimental to the soil, the crops from which being very detrimental to human health. The nutritive value of organic matter is also sometimes exaggerated, and there is no basis for many of the facts presented against commercial fertilizers which are not in the form of organic matter. Practically all soil chemists need no explanation concerning these misleading facts and are able to disprove them in the light of modern research. To the layman, however, this literature can be very deceptive and can induce him to accept the false assumption made regarding the harmful effects of chemical fertilizers. In order to clear up this situation, it is necessary to examine the claims made against chemical fertilizers in an effort to arrive at an explanation that exonerates chemical fertilizers to the layman's satisfaction.

One of the main claims that the organic farmers publicize is the belief that the use of chemical fertilizers lowers the fertility and brings about the erosion of our soils. To substantiate this belief, they give results from various experiments that they have made or observed. For example, they will use two crop plots, one fertilized solely with organic matter, the other fertilized solely with chemical fertilizers. The results of the experiment show that the plot fertilized with the organic matters produced the greater yield, the crops from which being higher in quality, and the Organiculturists conclude that these results are sufficient evidence to say that chemical fertilizers are making our soils poorer and producing crops which do not provide us with the correct amounts of nutrients to maintain our health. The experiment proves nothing of the kind. It only proves that organic matter was needed by the soil in the two plots more than was the addition of additional plant nutrients provided by the chemical fertilizer. The chemical fertilizers alone could not be expected to improve the physical condition of the soil to the extent that the organic matter does. The dealers of commercial fertilizers do not pretend to offer their chemicals as a substitute for organic matter as the experiment was set up to show. Chemical fertilizers will not take the place of organic matter in the soil, for a certain amount of organic matter is necessary to condition the soil from a physical sense in order that the plants may function properly in their environment and be able to utilize the nutrients offered in chemical fertilizers. In order to be accurate, the experiment should have been composed of three plots, the third being fertilized with both the chemical and the organic fertilizers. This third plot would produce the greatest quantity and quality yield, for the organic matter would improve the physical condition of the soil and, together with the chemical fertilizers, supply nutrients. In some cases, however, the application of chemical fertilizers to inherently rich soils, which contain an abundance of organic matter, may not produce a profitable increase in yields, for enough nutrients are already in the soil, but the application of chemicals to inherently poor soils, as some of those found here in the South where of organic matter and other recommended farming practices will be very profitable.

Many farmers plant row crops on easily erodable land and apply chemical fertilizers to these crops. When the land erodes, the blame cannot be placed on the chemical fertilizers, but should be placed on the farmer for not providing adequate protection for his land. It is not the presence of chemical fertilizers but rather the absence of organic matter and other recommended farming practices which causes the land to erode.

The Organiculturists say that chemical fertilizers bring about an over-development of cellulose in plants which causes growth to be too woody and decreases the protein content. This is not always true. The amounts of cellulose, carbohydrates, and proteins in plants depend largely upon the amount of nitrogen available to the plant. A high content of nitrogen makes for less cellulose, less carbohydrates and more protein; consequently, the amount of protein in plants can be regulated by applying a chemical fertilizer containing nitrogen. Plants absorb nitrogen in the nitrate or ammoniacal form. The nitrogen present in organic matter does not become available to the plant until the organic matter has been broken down, at which time the nitrogen is available in the nitrate or
ammoniacal form; hence, it is difficult to conceive that the Organiculturists object to the use of the nitrate and ammoniacal nitrogen found in commercial fertilizers, when the plant is going to get the nitrogen in the same form from organic matter.

These strictly “organic farmers” are principally against the use of water-soluble chemical fertilizers, and they advocate the use of water-insoluble chemical compounds, such as ground rock phosphate and other mineral rock forms which contains potassium and the trace elements. They apparently realize that organic matter alone cannot always meet the full requirements for crop growth. These ground rock fertilizers, become slowly available to the plant, and when they are available, many are in the same forms as those nutrients supplied in water-soluble chemical fertilizers. The chemist can extract these elements from their crude forms more quickly than if similar reactions are carried on in the soil. The Organiculturists still maintain that chemical fertilizers are harmful and tie up certain trace minerals, which then become unavailable to the plant. This could be true if improper fertilization practices are followed, but if proper fertilization practices are adhered to, the nutrients in the soil will be in balance, and little tying up will occur.

Besides tying up other nutrients, the organiculturists claim that the soluble chemicals then “force” their way into plants. “Forcing” apparently means that the plants do not want these nutrients and already have sufficient amounts of them and that these unwanted nutrients then substitute themselves for other nutrients really needed by the plant. If certain nutrients are not present in the soil or remain in an unavailable form, sometimes other nutrients will substitute themselves for the lacking nutrients, but if proper fertilization practices are followed, the nutrients will be in balance and will be available.

Crops can be grown in the complete absence of organic matter. A new phase of agriculture, hydroponics, works on the principle of supplying nutrients to the plants by chemical fertilizers alone. An artificial culture medium is used to take the place of soil, and the medium is regulated to supply to the plants grown adequate nutrients. Hydroponics produces crops of unsurpassed yields and quality. Natives in the South Pacific and other areas of the world, where these soils are too inherently poor to produce crops, have lived successfully from produce grown by hydroponic methods. Our soils need organic matter and cannot produce good crops following the applications of chemical fertilizers alone, but hydroponics prove that chemical fertilizers do not lower the nutritive value of crops, as is claimed by the Organiculturists.

The Organiculturists point to China as an example of strictly organic farming to show others that those who eat foods grown organically are less susceptible to certain diseases. Of all the places in the world to point to, the Organiculturists certainly picked the wrong country as an example of a type of farming that eliminates diseases. China is a country of many famines and diseases and needs its agriculture improved. The Chinese may not be susceptible to certain diseases, for where in the world can one find a better example of the “survival of the fittest”? The Organiculturists also say that the sulfur in chemical fertilizers cause cancer. Until more is learned about cancer, placing the blame on chemical fertilizers is only an assumption. The sulfur obtained by the plant from organic matter decomposition is largely in the same forms as that supplied by chemical fertilizers. In order to think clearly, one must read clearly. Oftentimes the literature written against the use of commercial fertilizers is misleading. Many articles, whose titles make claims against chemicals, give examples of the improvements in health experienced by those who eat foods grown without the use of chemical fertilizers. The use of chemical fertilizers beforehand is implied, but no actual statement is made as to what was eaten before organically produced foods were consumed. Those who ate the organically grown foods may have been eating only a handful of rice a day, but the reader can easily assume that foods grown with chemicals were eaten, as implied in the literature. Any improvement in nutrition, whether organically grown foods or foods grown with the aid of chemicals are used, will cause bodily improvement to those who eat the more nutritive foods. Until the necessary facts are known, it is unwise to make assumptions.

In summary, chemical fertilizers are not harmful to use. They can be put to a good advantage when used along with organic matter. Poor soils especially need the boost that the chemical nutrients offer, for organic matter is not too stable in some soils, and its advantages will be limited. It is not always practical or profitable to follow a large scale organic farming program; hence, for best crop growth, all of the organic matter possible—when it is practical—should be turned into the soil, and chemical fertilizers then used to promote the extra growth.
A. M. Musser Co-Edits Book

A. M. Musser, head of Clemson’s Horticulture Department, is one of the three authors of a new horticulture textbook. J. B. Edmond, a former faculty member here, and F. S. Andrews, associate professor of horticulture at Virginia Polytechnic Institute are the other two authors of Fundamentals of Horticulture.

Professor Musser is well-known for his work in the horticultural field, including the many varied experiments he has made in fertilization and pruning of fruit and pecan trees.

Professor Receives Degree

James F. Miles, Associate agricultural economist at Clemson Agricultural College has recently received his Doctor’s Degree from Cornell.

Dr. Miles, although he has been at Clemson for only three years, is well-known for his achievement on research in marketing farm products.

A graduate of Spartanburg Junior College and the University of South Carolina, Dr. Miles also studied at Furman University, the University of North Carolina, American University, the United States Department of Agriculture’s Graduate School, and Columbia University.

Between

Alpha Zeta Initiates New Members

The nine new members of the South Carolina Chapter of Alpha Zeta, national honorary agricultural fraternity, are fully acquainted with the organization now that a full week of informal “wear and tear” initiation is over.

The nine new members, their major, and their hometown are as follows: P. Alley, entomology senior of Macon, Georgia; G. B. Brockenbrough, agricultural engineering sophomore of Kinards; R. W. Duke, Jr., animal husbandry sophomore of Kingstree; R. E. Farmer, pre-forestry sophomore of Sevierville, Tennessee; T. H. Jeffords, animal husbandry junior of Florence; W. J. Jenkins, horticulture senior of Osborn; J. A. McCommas, animal husbandry senior of Elizabethtown, North Carolina; J. H. Robinson, agricultural engineering sophomore of Oswego; and J. H. Rodgers, vocational agricultural education sophomore of Lake City. (List of members taken from TIGER.)

Words for the Wise

Mr. J. M. Eleazer, Clemson Extension information specialist had words for the wise when recently asked by an AGRARIAN staff member what, in his worthy opinion, would make a good story for readers of the agricultural student publication.

Mr. Eleazer said that greater emphasis should be put on the management of pastures in South Carolina. According to the well-known Carolina columnist, quote: “The farmers in South Carolina know how to grow pastures, but they don’t know how to manage them.”

He mentioned the fact that many farmers overgraze their pastures and also fertilize their pasture plants improperly.

Students, ‘Tension!’

Just in passing, The Agrarian would like to remind agricultural students at Clemson College that the bulletin boards in Long Hall and Tillman Hall may prove worthy of one’s efforts in reading them. Various colleges and universities throughout the United States are “advertising” for graduates of different majors in agriculture who are interested in opportunities in graduate work. Various assistantships and fellowships are offered by many schools also.
Professor Teaches Economically

Professor Rallings, teacher of freshman agronomy at Clemson Agricultural College, is teaching on the economic scale presently. Mr. Rallings is assigning each of his freshman students an agricultural topic to speak on during class. “By teaching this way,” this popular professor says, “the teacher does less ‘yapping’, and gives the student a chance.” That’s teaching real economically!

Honor Awards for Scholarship Recognition Day 1951

The Danforth Foundation of St. Louis awards fellowships each year to two agricultural students. One of these is given to an outstanding member of the Junior Class majoring in either Dairying, Animal Husbandry or Poultry Husbandry. The award amounts to $180 and provides expenses incident to the attendance of the recipient at a two-weeks summer short course for training in salesmanship at the laboratories of the Ralston Purina Company in St. Louis and also for a two-weeks stay at the American Youth Foundation Leadership Training Camp at Shelby, Michigan. The fellowship for the coming summer was awarded to William Franklin Stewart, Jr. of Fountain Inn, Junior in Dairy Husbandry.

The second of these Danforth fellowships amounting to $50 is awarded to an outstanding freshman expecting to major in the animal science field. It provides for a two-weeks stay at the Leadership Camp at Shelby, Michigan—the same camp to which the recipient of the Junior award goes. The student receiving this award was John S. Wilson Parham, of Sumter, freshman in Animal Husbandry.

The Sears Roebuck Foundation provides funds each year for a number of scholarships awarded to freshman students in agriculture on the basis of a competitive examination. A Sophomore scholarship of $200 is also provided by the Sears Roebuck Foundation for that student among the winners of Sears Roebuck Freshmen scholarships who makes the highest scholastic record during his first year. The winner of this scholarship for the present college year, Robert William Duke, Jr., Animal Husbandry Sophomore of Kingstree, was determined last fall.

Each year the honorary agricultural fraternity of Alpha Zeta gives a prize to the Sophomore student in agriculture having the best scholastic record for the first three semesters of his college course. The prize this year—a five-year subscription to the Farm Quarterly, outstanding agricultural publication—went to Robert William Duke, Jr., of Kingstree.

The Borden Company Foundation of New York City makes available each year a scholarship of $300 to the agricultural student who in addition to his other courses must have taken at least two courses in Dairying, must have completed the Junior year, and must have the highest grade point ratio of students in that category. The scholarship for the present college year was awarded last fall to Winston Hall Sibley, of Greenville, senior in Animal Husbandry.

Mrs. C. L. McCaslan, of St. Matthews, has established a fund of $1,000 to be known as “The Clark Lindsay McCaslan Memorial Fund” in memory of her late husband. The income from this fund will be awarded annually to the most deserving student in Agricultural Engineering. This year the income amounting to $25 was presented to Robert Melvin Prince, Jr., of Lynchburg, senior student in Agricultural Engineering.

The Anderson Fellowship of $350 is awarded by the faculty of the School of Agriculture each year to that member of the graduating class who has the best scholastic record among those desiring to pursue graduate work. The graduate studies may be carried on at Clemson or at another institution, as the recipient desires. The fellowship for the college year 1951-1952 went to Earl Wilburn Moore of Westminster, senior in Entomology.

This year we have a new award to be made in the School of Agriculture. The Ladies Auxiliary of the South Carolina Dairy Association has awarded $50 to the graduating Dairy major with the highest scholastic record. The winner of this award was Maurice David Rice, of Augusta, Georgia.
Invitation to...

FORESTRY

By C. B. DALTON
Pre-Forestry '52

Are you among the thousands of college students in the United States who have no idea as to the type of work which they would like for a life-time occupation? If you are among this undecided group, then come along and I will try to give you an idea for your consideration. If you are ambitious and want to get ahead fast, forestry is a good field for you as it is comparatively young and is still in the pioneering stages. There is great opportunity in the fields connected with growth, management, and utilization of forests. Someone—to illustrate the enormous use of wood in a man's life—once said that a man uses more wood than any other material; it follows him from the cradle to the coffin.

When the word Forestry is mentioned, everyone automatically catches a mental picture of the solitary fire tower, or that of some mountaineer felling trees by means of the hand wielded axe. These positions are occupied by men who have not had the chance for a college education, or by some men fresh out of college who are working themselves up by experience. By no means is Forestry confined to these few fields.

Forestry is divided into two major divisions—Forest Management and Wood Utilization. These fields are then further broken down. Forest Management pertains to the management of wild lands, especially those being used for grazing, watershed management or recreation. A man doing this type of work not only needs a degree in Forest Management but also the fine qualities of a good leader as he is closely connected with the populous of the managed area and adjoining lands. For this degree he must have a very intensive study of Silviculture, Timber Estimating, Management, Fire Prevention and Control, Forest Pathology, Insect Control, Forest Soils, Economics and other aspects of land use. A degree in this field usually leads to outdoor work.

Wood Utilization is subdivided into three major fields. The first of these fields is Wood Technology which is concerned with the wood using and wood manufacturing industries. It requires that one thoroughly understand the processing of wood from cutting, logging, milling and seasoning to gluing, preserving, finishing, fabricating and machining. Pulp Technology requires that one understands the chemistry of wood and of paper manufacturing. Last of these three, but by far not least in importance is Lumber Production which requires that one thoroughly understand the distribution, selling, and use of lumber of various kinds.

These major divisions have branched out into so many fields that it would require pages and pages just to list them. Maybe you are interested in soil and water conservation, furniture manufacturing or many other fields. Forestry, or one of its branches, is connected with many allied fields.

Most men are looking for fields in which there is security. There is no other field quite as secure as Forestry. Wood is essential for the survival of the human race. Because of its great need it is necessary that new forests be continually coming on in the place of that timber which is now being cut out. Approximately 43% of the United States is forested and about 15% of its present land area is in need of forests. Approximately 59% of the Carolinas is forested. There are about 500,000 square acres to be managed by one man in the U. S. while there are only 10,000 acres per man in Europe. Though this is true, the people of the U. S. use about 20 times as much wood as do the Europeans. This should show that there is a very great need of men in this field.

There are jobs for men trained in this field elsewhere besides in the forest. Trained men in this field are needed by the veneer and plywood producers, plastic industries and in numerous other occupations. Men having a trend toward experimentation might be interested in the experiment stations now being operated by the United States Forest Service, State agencies and numerous private concerns such as paper and furniture companies.

A field closely allied to Forest is Wildlife Conservation. This field does exactly as the title states and in doing so has preserved animals and plants which were rapidly growing extinct. Not only has it stopped the extinction of these, but in cooperation with the Forest Service has reduced the amount of yearly destruction of the forests by fire. By controlling the number of hunters in the forests and by not allowing any campfire in the controlled area, the amount of fire loss due to man-made fires has been greatly reduced.

Laid before you here are only a few of the many jobs which follow a degree in Forestry or Wildlife Conservation (as these are usually offered together in most colleges). These jobs are only a meagre touch upon the broad and varied field which is summed up by the small word “Forestry”. If you are among the many undecided college students or if this article has interested you, why not look into the field in which you are most interested for there is surely some connection between it and some branch of Forestry. Here lies a young and growing field which needs young and ambitious men to help keep it growing.
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MAY 1951
S. C.'s PATTERN of PROGRESS

By WILLIAM D. POE

From Clemson to Charleston, from the mountains to the sea. That was the trip we made recently. We saw a lot of South Carolina, heard a lot of its people talk. And we liked what we saw and heard.

In a way the trip constituted national recognition for the state. For we were accompanying the agricultural committee of the American Petroleum Institute. Eighteen of its members came from all over the United States—one from Canada—to observe South Carolina’s progress on the tour arranged by Clemson College.

Beginning with a full day at Clemson, we made a two-day swing across the state by chartered bus. To Anderson, Blackville, Orangeburg, Summerville, and Charleston we went. And before us spread the new state Pattern of Progress that is bringing with it a richer way of life.

It is a broad Pattern of Progress—a dynamic pattern. Fourfold in its scope, it embraces:

1) More power,
2) More and better education,
3) "Two-Armed Farming"—crops balanced with industry,
4) New industries—agriculture balanced with industry.

Let’s see how each of these four elements fits into the picture of progress we found everywhere.

I. The Place of Power

"There simply isn't enough power in a mule to support a family. Yet for many years our farmers struggled to prove there is."

So wise Extension Director D. W. Watkins told our group. From 1949 to 1950 the number of tractors in South Carolina increased 467 per cent—the greatest increase made by any one of all the 48 states in the nation! As the number of tractors has gone up, the number of horses and mules has gone down. On our entire swing clear across the state we saw scores of tractors at work. How many teams of mules? Only two: South Carolina is casting off outmoded methods, is gearing itself with efficient production tools. And an important by-product of this transition is the release for productive use of thousands of acres formerly required to feed the work stock.

Another vital power development is in rural electrification. In 1939 only 14 per cent of the state’s farms were electrified. Today only 13 per cent are without electric service—87 per cent have it. Electricity is generating power for both better farming and better living.

A third form of power we saw is irrigation—the power to supply water when needed. On the truck farm of Newman Buck, Charleston County, we saw a dramatic demonstration of the possibilities of supplementary irrigation. His drainage ditches feed runoff water from heavy rains into three farm ponds. In times of drought water is then pumped from these three reservoirs onto thirsty crops. We saw his portable system irrigate a large field of cabbage. In a few minutes time he could move it to another field to water another crop.

At Clemson we saw tangible evidence of the state’s emphasis on power development. There a modern $250,000 agricultural engineering building has been completed to project all modern forms (Continued on Page 22)
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of power to the farmer. Keen, young Agricultural Engineer George Nutt and his staff are proud of their new building, eager to press it into full service of the state’s agriculture.

So much for the first part of the South Carolina Pattern for Progress: South Carolina is developing the power to do a good, efficient production job.

II. The Role of Education

But power without knowledge of how to use it is of little value. The farmer needs sound education and guidance to keep abreast of all of today’s rapid scientific developments. Clemson College through its extension service, experiment station, and resident teaching is constantly advancing vital information. Listen—

4-H clubs have a total enrollment of 51,000 boys and girls—more than 1,100 to the county.

A dynamic combination of agricultural, industrial, and educational advances promises balanced prosperity for the Palmetto State.

III. Balancing Crops With Livestock

"Twenty-five years ago," said Clemson Agronomist H. A. Woodle, "South Carolina was growing 2 million acres of cotton but had almost no pastures-worthy of the name. Now the state is growing only about 1 million acres of cotton, but it is pushing hard toward 1 million acres of improved pastures. We are making a successful effort to balance crops with livestock."

Although the coldest winter since 1879 had just ended, we almost never got out of sight of green pastures on our swing from Clemson to Charleston. A few years ago most of these fields now nourishing livestock would have been bare, bleak, and idle—idle except for the erosion that would have been busy after every shower—with farm hands and mules awaiting the cotton planting season.

"Agronomists from other sections say no other area can match the South in livestock production," continued Mr. Woodle, "We have the advantages of 1) a longer growing season, and 2) cheaper land. Also 3) winters are so mild no expensive buildings are needed. Folks are coming into South Carolina by the hundreds from many states. They are buying land we used to think worn out for $40 an acre and converting it into good pasture."

(Continued on Page 32)
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By R. E. FARMER
Pre-Forestry '51

By the end of each week are you tired of military life and the senseless little duties which must be performed each day? Are you tired of being "busted" by some rank happy individual for such things as "dusty radio tube" or "exhaling in ranks"? Well, I can't say that I have a remedy for the hardships laid on us by the military boys, but I do have a plan which may help some of you. Take a walk by yourself on Sunday morning, not in the afternoon, but early in the morning. Here are some of the things you will see and hear.

The early morning finds me standing over the swirling waters of Twelve Mile creek. Behind me are the houses and towers of Clemson; before me the River Birch stand out like white lines on the dark background of the swampy woods. Crossing the crude wooden bridge, I follow the frozen ruts which lead into an old corn field now grown up with grasses and sage brush. Upon entering the field, a crow rises on silent wings and disappears across the creek. From this new position he caws his warning to the rest of the black flock which immediately takes up the cry of alarm, "Caw caw beware caw man is here." And thus the surrounding territory learns of my arrival.

Proceeding across the field, I am pleasantly surprised by a fat young cottontail who bounds out of a clump of grass and goes zigzagging his way through the dead corn stalks. At the edge of the open field he stops, raises himself on his hind legs, sniffs the air, and then plunges into the woods. Going over to the spot of grass which was his hiding place, I find a snug little nest hollowed out in the dead weeds. It is still warm. As I stand there I cannot help but think of the many rabbits that have jumped from just such a warm nest, straight to their death. How many of these small animals have leaped from hiding only to be ripped down by the lead pellets from a shotgun? A small, vibrant ball of life reduced to a mass of warm fur and blood in matter of seconds. And yet this holdover from our caveman days is still called sport.

After leaving the field, the old road leads down a hedge row into the wooded hills. The air is filled with the singing of birds as I enter the woods, and I wonder at the variety of winter residents which are all around me. Some robins, looking very fat and comfortable with their feathers fluffed are hopping about in search of food. A small Downy Woodpecker spins around and round the trunk of an old pine in his quest for bark beetles. How empty a forest would sound without the staccato tapping of some woodpecker of sapsucker. As I slowly climb through the pines to the top of the ridge I notice how these trees keep the woods from looking so bare during the winter. Their green needles blending with the gray and brown of the hardwoods, creates a somber effect which, in its own way, is just as beautiful as the summer foliage.

On this particular ridge where I am walking there is a small but picturesque family cemetery which dates back beyond 1775. In the summer it is so obscured by the growth that one seldom notices it, and even in the winter its gray rock wells blend well with the landscape. Since its gate is sealed with stones, someone has removed part of one wall in order to get in. Through this hole I go. Immediately my sight falls on the one tomb which seems to be intact. It is covered by a large slab of granite on which the inscription can still be seen. It begins like this: "Sacred to the memory of The Honorable John Ewing Calhoun. He was born the year 1751 and died on the 20th of October, 1802", and ends like this, "He filled at the time of his death the high station of Senator of The United States. He died tranquilly in the bosom of his family, loved, honored, and lamented, looking forward with humble confidence in God to a happy immortality." All around the small graveyard can be seen the resting places of his slaves, and on the opposite ridge are the remains of his home. The terraced fields are now covered by a mixed forest of pine and hardwoods, and soon all traces of the plantation will be gone. Only the rock-walled cemetery will remain to remind us of a forgotten past.

With the sun high overhead I leisurely make my way back over the hills toward the old brick clock tower. Walking down the street with my mud covered boots as people begin to leave church, I realize that a walk outdoors is much more pleasant and inspiring than sitting in a stuffy building all morning. My mind cleared and refreshed, is ready for another week's work.

TWENTY-FOUR

THE AGRARIAN
By R. E. FARMER  
*Pre-Forestry '53*

**Along Nature’s Trail**

If you travel for a few miles on the black top road to Lawrence Chapel, which leads northward out of Calhoun, you will soon come to a sign announcing the Clemson Wildlife Management Area. This tract which is part of the Clemson Land Use Area is being utilized for wildlife production under the management of Mr. R. M. Berry, a graduate of the University of Michigan and New York State College, who came to Clemson last summer. The work at the present time consists of planting plots of bicolor lespeceza which produces excellent food for birds. Right now Mr. Berry says that there are a few covies of quail already in the area. Later he plans to stock the land with deer and turkey.

Lake Esaquena, a small artificial lake, is located in this area close to the North fire tower. Originally built for recreation, the lake has been so muddy that people were not attracted to it. The country around the water is pretty, with thickets of mountain laurel and a pine and hardwood forest. There is a trail constructed which follows the entire boundary of the lake, and an old picnic area is located on the west shore. Esaquena is open to fishing, and a few people take advantage of this, but in the long run what could have been a beautiful spot is ruined by the mudliness of the water.

This land is being developed not only from the wildlife standpoint but also for timber production. Within the next few years a complete forest inventory will have been taken, and the area will go under strict forest management. Soon this land should serve as an example of what can be accomplished by proper wildlife management.

As I was wandering around in the bottoms the other day, I noticed that the high water stakes have been placed for the new Hartwell Dam. It might be interesting to know just how the lake will affect Clemson land if it remains full. When I looked at a map of the lake area, I found that Clemson will be more or less a peninsula. One the south side of the campus the water will fill the hollow below the dairy barn and will cover the present road leading south. To our north the Seneca River bridge will have to be removed and the road re-routed in order to avoid the lake. All the Seneca River bottoms will be covered completely and there will be about twenty-five feet of water in the football stadium. This presents a problem which must be solved within the next few years. Will another stadium be built or can the old one be protected by a dike? If a dike is built we should remember that the little stream coming down from the power house would have to be pumped out when the lake is full. Of course the dam won't be completed for about five or six years unless it is needed for some emergency, but still it gives one something to think about.

Recently I had the chance to see and study one of the most interesting wild plants in this part of the country. I had heard often of this Shortia or Ocone Bell, but had never seen it until Professor Rosenkrans took our Systematic Botany class up to Jocassee, a community in the foothills of Pickens County. The Ocone Bell is found in only two small sections of the world. Some is reported to be in Japan, and the rest grows within a small area in Pickens County. How it got there no one knows. Jocassee is a small backwoods settlement near Salem. A few years ago it was a thriving summer resort, but now the buildings and lodges are falling apart from lack of attention. A clear mountain stream flows through the small valley, and there is an abundance of white pine, hemlock, laurel, and rododendron. The Ocone Bell is found in the surrounding hills and invariably grows in shady moist places. Sometimes it spreads throughout the whole side of a hill making a carpet of green shiny leaves. Shortia is a medium sized plant, blooming early in April with a white bell shaped flower, which is quaintly beautiful against the green background. How did it get there? Why hasn't it spread? These are mysteries of nature that haven't been solved yet.
Antibiotics Offer
Poultry Pep-Up

Animal proteins have been known since 1900 to be necessary for good chick growth in chicken rations as well as in the rations of some other domestic animals. Vitamin B<sup>12</sup> was isolated recently and it was found to be the most important factor present in animal proteins that is not present in plant proteins. Animal protein factor concentrate is being produced in such large amounts that it is available to commercial feed manufacturers to mix with their feeds. A majority of the commercial feed manufacturers include animal protein factor concentrate in their poultry rations at the present time.

**HOWARD N. RAWL**

*Poultry '54*

The isolation of Vitamin B<sup>12</sup> was announced by two laboratories at about the same time during April of 1948: Merck Laboratories in the United States and Glaxo Laboratories in England. Each of these laboratories found that it contains phosphorous and cobalt. Merck Laboratories isolated Vitamin B<sup>12</sup> from liver after twenty-two years of research for this vitamin. Most of the animal protein factor concentrates are produced from a bacterial fermentation process, but some of it is produced from antibiotic residues.

Animal protein factor concentrate is a group of vitamins which includes Vitamin B<sup>12</sup> as well as other vitamins necessary for the most efficient growth. Vitamin B<sup>12</sup> is found in poultry meat, eggs, cow and poultry manure, and animal proteins. It is present in built-up litter to the extent that it promotes chick growth. It has been known to be contained in cow and poultry manure for some time. The concentration of Vitamin B<sup>12</sup> in the animal protein factor concentrate made by the original producer is twelve and one-half milligrams of vitamin per pound of concentrate. The concentrate has been used in most of the experiments conducted by researches. Merck Laboratories is the only company which advertises the amount of Vitamin B<sup>12</sup> in its product. Lederle Laboratories have recently increased the vitamin content of their product from .23 to 1.8 milligrams of Vitamin B<sup>12</sup> per pound of product. Pfizer Laboratories' concentrates contain three and six milligrams of Vitamin B<sup>12</sup> per pound of concentrate. The Vitamin B<sup>12</sup> content of United States Industrial Chemicals' product is 3.5 milligrams per pound of product. The concentration of Vitamin B<sup>12</sup> in these products has a very wide range. Pure Vitamin B<sup>12</sup> and animal protein factor concentrate are not equal to each other in their growth promoting ability. The concentrate is more effective in promoting growth on a Vitamin B<sup>12</sup> content in the ration basis.

Vitamin B<sup>12</sup> is definitely necessary in chicken feeds to obtain maximum feed efficiency and for good hatchability of eggs. The advantages of animal protein factor concentrate greatly outweigh the disadvantages. The advantages of this new concentrate are that it and soybean meal can replace costly and hard-to-get animal proteins, it will produce better feed efficiently when supplemented to some commercial rations containing seven and one-half per cent animal proteins, and it reduces the total cost of the diet from two to six per cent. The two disadvantages of animal protein factor concentrate are that it is not readily available to farmers so that they can mix it in their own feed and its cost is high, but the cost is offset by more economical production. The most noticeable effects of a deficiency are slow growth in chicks, excessive mortality, and low hatchability. Other effects of a deficiency are lowering of the feed efficiency, poor feathering, and gizzard erosion.

Numerous experiments have been conducted with chickens to determine how effective animal protein factor concentrate is in promoting growth.
and increasing feed efficiency in rations containing animal proteins. Experiments have also been conducted to see if this concentrate and soybean meal could completely replace the animal proteins in a chicken ration. L. C. Norris and his associates found in one experiment that ten and four-tenths micrograms of Vitamin B₃ per pound of ration resulted in an additional gain of one and sixteenth-hundredths pounds in four weeks. Animal protein factor was the only source of Vitamin B₃ in this ration. Pure Vitamin B₃ produced the same results. T. Stevens and his associates found that when hens were fed a rich animal protein ration, Vitamin B₃ will not increase growth in chicks hatched from eggs laid by these hens, but will increase the feed efficiency of these chicks. They also found that even though it is present in amount for normal growth, it may not be present in a sufficient amount for maximum feed efficiency. In one of E. L. Johnson's experiments one-half percent animal protein factor concentrate increased chick growth twenty-two percent during the first eight weeks. The feed efficiency was two and six-tenths for the all-vegetable ration and two for the all-vegetable plus one-half percent animal protein factor concentrate ration. In a practical test seventeen-hundredths percent animal protein factor concentrate increased the feed efficiency from three and seventeen-hundredths to three. The basal ration contained six percent fish meal as the only animal protein. Soybean meal with one percent animal protein factor concentrate was equal to four percent fish solubles in promoting growth under the same conditions. United States Industrial Chemicals' concentrate was much more effective in promoting growth than Merck Laboratories' concentrate on a Vitamin B₃ content basis, but the latter one was slightly more effective on an animal protein factor concentrate content basis. The feed efficiency was not printed with this experiment. United States Industrial Chemicals conducted an experiment with their concentrate to determine if it and soybean meal could replace the animal protein in a high quality commercial broiler mash. A feed efficiency of three and seven-hundredths resulted when a commercial broiler mash containing five percent fish meal and three and three-fourths meat scraps was fed, and a feed efficiency of two and ninety-seven hundredths resulted when .175 percent animal protein factor concentrate was used. In the latter ration more soybean meal was added at the expense of all the animal protein and some of the corn. The protein percentage in both rations was the same.

Experiments with laying hens prove that Vitamin B₃ is absolutely essential for normal hatchability. L. C. Norris and his associates found that when hens were fed a ration containing no Vitamin B₃ for some time, the hatchability of eggs from these hens declined to twenty-five percent. Idaho State College fed an all-vegetable diet to laying hens for several months. None of the fertile eggs produced by these hens hatched. A one percent animal protein factor concentrate in the ration increased the hatchability to sixty-eight percent in four weeks. Hens that had been fed a diet with a high percentage of animal proteins were put on Vitamin B₃ deficient diets. The eggs from these hens maintained a hatchability of eighty-five percent after being on this diet for four months.

Several researchers who have experimented with Vitamin B₃ and animal protein factor concentrate in chick diets have made recommendations on how much Vitamin B₃ to use in chick diets. There is a wide range in the recommendations made by the different researchers. A sufficient number of experiments have not been carried out with pullets or hens to make recommendations, but it is usually taken to be the same as for chicks. Dr. Gerald Combs recommends a five percent animal protein ration even if vitamin is added in another form. In direct contrast G. M. Briggs, E. G. Hill, and M. J. Giles state on the basis of experiments that animal proteins are not needed for fast gain and economical production. J. C. Fritz recommends ten to twelve micrograms of Vitamin B₃ per pound of ration. He also states that the requirement for Vitamin B₃ increases as the protein content increases. Five micrograms of this vitamin per pound of diet was found to be sufficient when undepleted chicks were used. The Minnesota high energy-low cost starter ration contains seven and one-half micrograms of Vitamin B₃ per pound of ration. The "Super Laying Mash" which is mixed and sold by a farmers cooperative contains one-tenth percent animal protein factor concentrate and three and three-fourths percent meat scraps as the only sources of Vitamin B₃. As a result of work conducted at Cornell University, it appears to researchers that under practical conditions, chick starter rations should contain one and one-half to two micrograms of Vitamin B₃ per pound of diet.

The cost of producing Vitamin B₃ in the form of a concentrate has dropped by more than one-half since it first became available in the fall of 1949. The present cost of Merck Laboratories' animal protein factor concentrate is one dollar and thirty-three cents per pound in fifty pound lots. An all-vegetable ration can be supplemented with animal protein factor concentrate at cost of fifteen cents per hundred pounds of feed. An estimate has been made that farmers saved ten million dollars in their feed bill during the last six months through the use of animal protein factor concentrate.
Agrarian Philosophy

By the Editor

When May 13th rolled around this year, the students at Clemson again put on their annual Mother’s Day spectacle. It is only fitting that we should have paused a moment to think just what Mother’s Day should mean to us.

To many Clemson students Mother’s Day probably meant just a day on which they must clean up their rooms a little better than usual: On which they must watch their language because some lady might be around on the halls; or on which they must parade on a hot Sunday afternoon in hotter blouses. To these people, Mother’s Day at Clemson must have seemed like wasted time and effort. To many other students, Mother’s Day probably denoted a day on which their mother brought a picnic lunch up to Clemson and they were granted a brief respite from messhall chow and enjoyed a feast on some of Mother’s home cooking. Yet these are the same students that were always complaining about not being able to go home more often, who always sat in the messhall and exclaimed, “This isn’t like my Mom’s home cooking.” These are the students who have lost the true meaning of Mother’s Day.

This being the case, let us ask ourselves just what is Mother’s Day. What does this day signify? What is the true meaning behind Mother’s Day? To properly answer these questions, we should decide first just what our mothers mean to us. First, being a Mother is the most painful thing in the world. That is painful not only physically but also emotionally as well. A mother must watch a child that was once a physical part of her body grow older and farther and farther away from her. She must not only watch this process of separation, but she must aid it. She must all the time seek to build up her child’s independence, and yet, every step of the way she is tearing into her own heart. Yet all this and more she gladly does for the sake of the love she bears her son. To us, the students at Clemson, as well as to all other young adults, our mothers should bring to mind the person who brought us into this world: the person who made it possible for us to take the step into adulthood that we are now taking.

Now, having decided just what our Mothers mean to us, we are in a position to determine just what Mother’s Day should mean. Mother’s Day should be the most important day in the year to persons of our age. It should be a day when we rededicate ourselves and our love to these mothers who have done so much and who have sacrificed so greatly to make us what we are today and what we will be tomorrow. It should be the time for us to show our mothers more than ever that we honour, respect, and love them. It should be a day when a mother can look at her son or daughter and say to herself with pride, “This is my child; I made him what he is today, and he loves me for it.” It is also the guiding hand of our mothers that shapes us into the personality that we are. All of our actions, all of our thoughts, all of our character is a product of the type of environment that our mothers have provided for us through our homes. Thus we should remember that all of our deeds reflect upon the kind of rearing that we have been given and that through this they reflect upon our mothers. This being true, we should, on Mother’s Day, rededicate our lives and determine to try to live them in such a way as to bring credit and pride to our mothers.

This, however, is an agricultural magazine, and we should try to clarify just what Mother’s Day should mean to the son of a farmer. To the boy raised on a farm, Mother’s Day should have more meaning than to any other person, for on a farm the mother exerts more influence on her children than in any other place. The farmer’s wife represents the true spirit of the home more than any other type of wife. The whole farm revolves around this important person, and she brings it to a close-ness and unity that cannot be achieved in any other type of home. The boy from a farm is particularly lucky when it comes to his mother, and he should not be ashamed to show his mother on Mother’s Day that he realizes this advantage which she has given to him and that he appreciates it from the bottom of his heart.

Thus, we have decided just what a mother means to us and just what Mother’s Day is for. Now, we should be determined more than ever to make each Mother’s Day a special day on which it is our opportunity to prove to our mothers our deep devotion and love for them and our great gratitude and appreciation for all that they have done for us. God bless them!!

TWENTY-EIGHT
it began with grass and a cow

GREEN feed the year 'round — like the grass a cow harvests for herself — that was the need which Allis-Chalmers set out to meet with this Forage Harvester.

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Was Darwin Right? . . .

Continued from Page 6

And in these past 50 years our livestock per capita has declined from 2.65 to 1.3 animals per person.

Oh, but you say that science will solve all this by producing more food per acre! But what happens when that last acre of ground is producing to capacity and population is still growing?

And don't think that this is just something in the distant future that won't concern you. Population today is increasing at a tremendous rate. For a 25% increase of the world's present 2.25 billion is a big increase, whereas when the earth had only a million inhabitants, an increase in this proportion didn't mean much. It has been estimated that even if the South's population keeps increasing at its present rate, in 300 years there will be 300 million people here. Can the South support that many?

Do you still want to send our valuable resources and food to overpopulated foreign lands? And are you still in favor of letting all the poor, displaced persons into this country to reproduce and further increase population?

The cold truth remains that America is going to face a food crisis at some time in the future. Will she follow the paths of the Chinese, the Romans, the Greeks, the Turks, the Egyptians, and the failing British Empire, or will she stand the test of time? I think she will stand the test and I'll tell you why:

It is evident that the only way to lick Darwin's principle is to halt the increase in population. I think this will come about in America due to a natural process, the idea of which I received while looking at some statistics in a genetics book. It seems that the birth rates of uneducated people average high, about 5 or six children per family, while educated people, such as teachers, doctors, lawyers, and others, average slightly more than 2 children per family—just enough to replace the parents and to allow for bachelors, accidental death, etc. Of course, there are many exceptions, but the overall picture is the important thing.

The wheels of population are already slowing down. Although our population is still increasing at a rapid rate, the percent increase is declining as the privilege of education is made more and more available to all. The processes of education must be speeded up. Birth control is another answer.

I cannot explain this phenomenon of education's limiting population: but I do know that Darwin underestimated man when he placed him in the "All-organisms" class, whose fate is to be determined by the laws of chance. I can picture but a Master Plan, with man, the divine form of life, playing an important role.

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Agriculture Meets Industry
Continued from Page 8

for their industrial goods, but tariff barriers would mean that the southern farmer could no longer exchange his goods for cheap foreign merchandise.

Since the civil war the southern farmer has had to contend with farm land that has lost much of its fertility and productivity and with the loss of cheap farm labor. The state has progressed a long way since the war but does not enjoy the station among the states that it once held.

The question arises, will the awakening of the industrial possibilities of the state make South Carolina supreme again, and will the state forsake its agriculture for the more profitable industrial enterprises? Is it too early to consider such possibilities?

Agriculture in South Carolina is becoming more permanent. Year round grazing programs are challenging King Cotton for top honors. Cotton, which once forced cattle out of South Carolina, finds a more worthy opponent this time. The abundance of cheap labor which first helped cotton in is no longer available, and even with the advent of successful mechanical pickers, cotton growers must face threatening competition from growers in the West.

With the coming possibility of industry in the South, the possibility of further losses of farm man-power to industry is inevitable, even though some immigration of northern workers would be expected.

Looking into the future, is it not possible to visualize a great industrial state with livestock production predominating the agricultural scene? Perhaps the recent livestock expansion in this state is fortunate and timely, for livestock can integrate with industry leaving industry the labor monopoly that it must have. The permanence of a livestock program leaves agriculture in this state with new hope of continued existence.

The Gerrish-Milliken textile mill at Pendleton, South Carolina, with its livestock landscaping job has been described as, “Where Agriculture and Industry Meet”. The cattle are still grazing away at the ladino-fescue pasture in front of the mill.

The above are only speculations, but industry in South Carolina has been expanding rapidly in recent years, but with the possibility of further industrial expansion comes the realization that the state has two appealing inexhaustable natural resources —water and sunshine. Because of these two resources the soil becomes a valuable asset. The soil’s resources are exhaustable, but pasture land will hold its potentials intact for future generations. If industry does come, its factories may be welcomed and complimented by a livestock state.
At Clemson and at Edisto and Summerville branch experiment stations we saw intensive work under way on year-round pastures and pasture drainage.

That’s another part of the pattern: South Carolina is diversifying its agriculture, is balancing crops with livestock.

IV. Balancing Agriculture With Industry

“For many years South Carolina has had nearly as great cash income per acre of cropland as Iowa. But we have had five times as many people per land unit as they have. To get greater per capita income we must increase the size of our farms and decrease the number of people on them.”

So said Clemson’s C. G. Cushman, leader in dairy extension work. Grassland farming requires much less labor than crop-farming and is bringing on just such a transition. And in crop-production tractors are displacing farm hands. Where are the surplus people going—those no longer needed on farms? Into industry, most of them. South Carolina has been one of the leading states in the nation in increasing industry since the war. And many of its farm people are filling the thousands of jobs that industry is providing.

Since 1945 more than 800 new industries have been built in the state at a total cost of $385 million. Major expansions have been made in more than 1,000 additional plants at a cost of $269 million. Notable among the new industries is the tremendous Du Pont plant near Camden. The Singer Sewing Machine Company is building a $10 million plant near Clemson. The vast textile industry in the Piedmont is booming. Near Charleston there is a potential industrial area of nearly 10,000 acres with a fresh water supply so abundant it has drawn national attention through a leading article in the Saturday Evening Post.

But by far the most spectacular recent industrial event in the state is the erection of the U. S. government’s $600 million H-Bomb plant on a site of some 250,000 acres along the Savannah River. This plant will employ an estimated 8,000 workers. Its effect depicts in miniature what the coming of industry is doing all over the state. Farmers in the area know it will make farm labor scarce. They are rushing to buy more farm equipment. This will enable them to tend more land, will eventually mean larger farms.

That rounds out the fourfold Pattern of Progress: South Carolina is balancing agriculture with industry.

Such is the fourfold pattern we saw spread before us as we rolled from the mountains to the sea. It is a dynamic pattern, at times ruthless. But the direction is ever onward and upward. It was fascinating to watch this ancient agricultural state casting off the shackles of a one-crop system and marshaling all its forces for the Better Day ahead. And South Carolina farmers and agricultural leaders are the vanguard of this new Forward March!
Why IH springs stay lively longer

A report to you about men and machines that help maintain International Harvester leadership

Automatic coiler "hatches off" 10,000 springs a day. It is one of many automatic machines that coil more than 5,000 different springs for IH products. These high quality extension and compression springs are made from thread to finger-size wire. They are as thin as 1/4 of an inch... as thick as five inches... as short as 1/4-inch and as long as five feet!

"Ferris wheel" ride makes springs act alike. A slight difference in length makes a big difference in the performance of the same spring. That's why the length of valve springs may vary only a few thousandths of an inch. Here are 288 corn planter springs riding the "ferris wheel" through a big grinder which makes them all exactly the same length.

Every valve spring must prove its strength. After IH springs have passed many gauging tests during manufacture, they are subjected to a load test—forced to confess their true strength on the scales. Their strength must not be more than five percent above or below normal. The scales themselves are checked for accuracy by their manufacturer every month.

Millions of "push-ups" test valve spring stamina. This valve spring tester, which simulates actual engine operation, compresses valve springs millions of times. When this fatigue test is completed, the length and compression of these springs is double checked. They must not shrink in length or load beyond the rigid standards to which they are designed.

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Number 8...THE BALTIMORE ORIOLE

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