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Clemson University

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THE AGRARIAN

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CLEMSON UNIVERSITY
Spring - Summer 1965
NOW! YIELD + QUALITY

In the long successful push for production of crops — first gaining impetus during World War II, followed by the demands here and abroad, quality of crops was somewhat forgotten. This push for production has been translated to a production per acre basis with many crops as a result of federal acreage controls. Fortunately, with some crops the two go more or less hand in hand. With others, unfortunately, high production is gained somewhat at the expense of quality.

A case in point is tobacco. Production per acre has increased. Quality has gone down. Problems have been created in satisfactorily meeting the requirements of domestic manufacturers or attempting to compete in the world tobacco market.

A question logically arises. Federal program be what it may are we fully applying the know-how which research with fertilizers has revealed about growing both high yields of flue-cured tobacco and quality leaf. The answer is — not fully. I refer to recent work in South Carolina and in adjoining flue-cured growing states on amounts and forms of nutrients. This work has been recognized by The Tobacco Workers’ Conference in their current recommendations for growing flue-cured tobacco. Results from these extensive experiments call for fertilizers containing —

MORE nitrogen in NITRATE form.
HIGH potash content.
LOW chlorine content.
REDUCED sulfur content.

Simple, yes, but highly effective as proven conclusively in South Carolina and other nearby states. Fortunately now, as never before, there is a material available to fertilizer manufacturers which makes it entirely practical to formulate tobacco fertilizers having more nitrate nitrogen, high potash, low chlorine and a reduced level of sulfur.

It is NITRATE OF POTASH.

Rodger C. Smith
SOUTHWEST POTASH CORPORATION
The Agrarian is published twice yearly by the undergraduate agriculture students of Clemson University, and coordinated by The Agrarian Staff. Opinions expressed in the magazine reflect solely the opinion of the author and do not necessarily reflect the policy of the College of Agriculture and Biological Sciences or Clemson University.

The untamed West? No. A bit of history is represented by the drawing on the cover of this issue. The South Carolina of the early colonists knew it resembled very little the cleared, cultivated, and inhabited country that we are acquainted with. And it is an error to imagine that the whole surface of the state was covered with unbroken forests, canebrakes, and thickety swamps. In many places there were extensive open plains, or savannas, and these were covered with grass upon which grazed herds of deer and buffalo. It has been said after that no buffalo existed east of the Alleghany Mountains, but the evidence to the contrary is very clear.

The early Spanish explorers spoke of the "great hump-backed oxen"; James Glen, one of the early governors, also spoke of them. But even if such direct testimony were lacking, the common use of the name, such as Buffalo Creek, Buffalo Springs, and so on, all through the upper portion of the state, would point unmistakably to their presence. Although their name has lingered and their bleached bones and deep-worn trails long remained as evidence of their numbers, they were the first large game to disappear, and the elk soon followed. In addition to elk and buffalo there was also to be found deer, wolves, wildcats, panthers, bears and beaver.

Cover story and design by staff artist Bob Upson.
AGRARIAN PHILOSOPHY

This semester is the last lap for the Seniors. After nearly four years we must face the cold, cruel world on our own. If one were to ask each of the approximately sixty-five graduating seniors for an analysis of his college career or a bit of advice to freshmen and other underclassmen, I'm quite sure he would get sixty-five entirely different viewpoints.

Studying and academics is only part of one's education. Surely these are important parts and are, in fact, the reason for the establishment of the University but they are only a part of the overall picture.

One of the most beneficial aspects of an education is the associations with other people—both faculty and students. At a university such as Clemson, one comes in contact with people from all walks of life. He has an opportunity to meet people with entirely different points of view from his own. By associating with these individuals his horizons are greatly broadened.

Living off from home for four years is also an important phase of one's education. He must learn to budget his time and his finances. No one is present to tell him what to do and when to do it, he must depend on his own judgment. This is a new experience for most individuals and one which has a great effect on later life.

Extra-curricular activities play an active part in one's education. By working in student organizations one can develop his leadership potential and can express his own views. When an individual accepts an office in an organization he accepts a certain amount of responsibility with it. The members have expressed their faith in his ability to do a particular job, and anything less than the very best the individual can do will betray their trust. By accepting these responsibilities the individual accepts the trust of his fellow members, but only by meeting these responsibilities can he justify their trust in him. Many times he must sacrifice his own pleasures for the benefit of the group but he should realize this before he accepts the responsibility. Learning to make these personal sacrifices for the organization is part of an education.

There are many other aspects of an education. The important point is to develop all of them rather than just one. For an individual to be successful in life he must have a well-rounded, balanced education.

JCW

FFA News

On September 29, 1964, the annual FFA cookout was held at the Food Industries Building. Over 50 members and faculty advisors attended. Dr. Davis, Head of Agricultural Education Department, spoke to the members present. He also mentioned some problems which new vocational agriculture teachers are likely to confront.

Hugh Caldwell, President of FFA Chapter, represented the Clemson University Chapter at the National FFA convention in Kansas City. Af-

(Continued On Page 9)

Insects And Sound Waves

BOBBY VAN HOOK, Entomology

Sound strange? In the next few years sound waves may become one of our more important control measures for certain insects. Experiments are now being carried out at several USDA Entomology Research Stations. One such place is the Cotton Insects Research Division at Pee Dee Station in Florence. Here, under the direction of Dr. H. M. Taft and Mr. H. R. Agee, work is being done with the cotton bollworm moth.

There are several groups of insects that are responsive to sound. The more important group is the Noctuid family of moths, to which the cotton bollworm moth belongs.

It has been known for some time that bats using a type of sonar locate moths and other insects for their meals. Some of these insects such as the cotton bollworm moth have evolved counter measures against the bat's sonar.

The cotton bollworm moth has a tympanum located on each side of the body just under and behind the rear wings. This is the organ that is responsive to the ultrasonic sound waves of the bat. When the moth hears the bat approaching it will either fly off in the other direction or dive to the ground in an attempt to escape.

The object of this experiment is to simulate artificially the sounds produced by the bat. This could be used as a control measure by keeping the moth out of the cotton fields. This experiment requires a great deal of preliminary work that is being carried out this winter. When summer comes, the experiment will be taken out in the field to be tested on the moths in their natural environment. Who knows? In the next several years we may be using sound as a measure to control this pest and possibly certain others.

ASAE News

The South Carolina Student Branch of the American Society of Agricultural Engineers is looking forward to the annual University of Georgia - Clemson University banquet to be held at Georgia in the very near future. In addition, plans are being made for a field inspection tour of facilities of Tennessee Valley Authority, United States Atomic Energy Commission, and Athens Plow Company in Eastern Tennessee.

This year the club has gained six new members while losing two via graduation and change of major.

Gene Rochester, 65, club president and second vice-president of the National Council of ASAE; and Bobby Morgan, 65, represented the club at the annual Winter Meeting of the National Council in New Orleans, Louisiana, in December.

HAROLD ALLEN

TWO
For a long time now, the Horticulture Department at Clemson University has realized the necessity and desirability of a designated area for both research and the display of ornamental specimens commonly grown in this section of South Carolina. This area would provide many of the much needed facilities for study in the field of horticulture and specimens would be made available for the study of plant material.

The field of horticulture is quite broad and it would be quite a task to bring together in this relatively small area a valid representation of this field. Yet this is what we in the Department of Horticulture at Clemson are doing in this area we call the "Ornamental Grounds." In addition to serving as a valuable part of the teaching program, this area will be convenient to the campus and will serve in the interest of the public of South Carolina and surrounding states.

The present area set up for research is located about a mile and a half from the R. F. Poole Agricultural Center of the College of Agriculture. This area of approximately twenty-seven acres is located on moderately rolling ground surrounded by several wooded sections of natural pine and hardwoods. Located within this area is a one-acre run-off pond which serves to irrigate the entire grounds.

Obviously, if this area was to be developed, a general plan was needed since prior to this time building and planting has been done on a "here is a good place" basis. Designing came through the teaching part of the university program when the planning of this area was turned over to the seniors in an advanced landscape design class.

In the fall of 1964, starting with this area along with the present greenhouse, cold frames, tea house, lathe houses, Camellia collection and a briefing on the general needs of the area, the students tackled the project. The plans were to include an organized shrub collection, Camellia collection, rhododendron and azalea collection, ground cover specimens, an herb garden, areas designated for research and plant introduction, tree specimens and a building for storage of equipment. A shrub collection of sort had been started, but no specific plan was being followed. Also, if this area was to be a showplace for the public, sufficient parking must be provided for.

The class of eight seniors had completed their plans by the end of the fall semester and had come up with many interesting ideas and suggestions concerning the area. Throughout the entire plan a strong effort was made to display various species of material in their natural surroundings and as a result tree and shrub specimens enhance the parking facilities as well as the peripheral boundary. Ground cover plots are placed in their natural settings of both sun and shade. The existing shrub collection is to be rearranged and expanded to include over three hundred plants with room for further expansion.

Plans were also drawn up for an attractive sign to introduce the "Ornamental Grounds," and a design was submitted for a welcome center located at the main entrance to the grounds. This welcome center would supply all visitors with information about the grounds and would include a list of plant material provided. Also, to be lo-

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Agriculture: A Major Contributor In American Growth

GEOE W. DUKES, Agricultural Economics, 1965

If one would take time to examine the great nations that exist, and have existed, on this Earth, he would discover that they all have followed practically the same course of economic development. At first these countries would consist primarily of people who had only one objective in mind—that of providing the necessities of life for themselves and their families. Thus, the economy of a developing country in its early stages is almost entirely agricultural. As the country continues to develop, the agricultural sector of its economy will become smaller, and that portion of its population devoted to fulfilling the less urgent needs of its people will become larger. It should be evident, with a little knowledge of history, that this is the course of development our country has followed.

The United States of America established by the ratification of the Constitution consisted almost entirely of citizens who lived and worked on farms. The efforts of these people were aimed mainly toward survival. They produced very little that was not consumed by themselves. Today, however, this same United States of America is the most prosperous nation this world has ever seen. Our gross national product is over 600 billion dollars, and American citizens enjoy a level of living superior to that of any great civilization, past or present.

Who or what has been responsible for this development? This, I believe, is a question that cannot be answered easily. There have been many forces which have contributed to this growth. It would be difficult, in fact I believe it would be foolish, for anyone to try to attribute this development to any single sector of our economy. I do not think, however, that it would be foolish at all to attribute a sizeable portion of this success to the American farmer. A brief look at the history of agriculture in America will make this evident.

The early American farmer had to put in many hours of back-breaking labor just to produce enough food and fiber to sufficiently satisfy the needs of his own family. As the farmer gained experience in the art of production, he was better able to evaluate and adapt new techniques and to make improvements in his old techniques of production.

Research and creative thinking in many different areas has poured forth new methods and implements, all of which have been cordially received by the farmers and incorporated into his farming program. The farmer operating under our competitive, free enterprise system has sought earnestly to improve his managerial ability, and in turn to make the most of the resources available to him.

The farmer has progressed from his old subsistence level to a point, at present, where one farmer can produce enough to feed himself and 32 other people. The increase in agricultural production has been so tremendous that it has outstripped our population growth and has given rise to the surpluses we hear so much talk about today.

This great increase in efficiency of production on the farm has cleared the way for labor to enter industry with the assurance that they will have adequate food and fiber to meet their needs. This labor has been utilized to such a degree that today American industrial production stands second to none.

The farmer has not only contributed to American growth by expanding his output, but he has also been instrumental in the development of a sound political system. It was largely an agrarian effort which compelled the British to relinquish their control over the Colonies, and many of the men who met in Philadelphia in 1787 to draft our Constitution had derived their living from the soil.

The farmer has always been a source of patriotism in the struggles which have confronted us. He has always maintained a belief in individual freedom and dignity, and has devoted his efforts toward maintaining these as highly prized possessions for all Americans.

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OUTSTANDING ALUMNUS

JOHN D. RIDLEY, Feature Staff

Dr. George Herman Wise, Professor of Animal Industry at North Carolina State University of North Carolina, Raleigh, North Carolina, is now president of the American Dairy Science Association. He was the recipient of the Borden Award in Production for 1949. Dr. Wise was born and reared in South Carolina. He received his B.S. degree from Clemson Agricultural College in 1930, and his M.S. and Ph.D. degrees from the University of Minnesota in 1932 and 1936, respectively.

Dr. Wise has held the following positions since graduation from Clemson, Assistant, University of Minnesota 1934-36; Associate Dairy Husbandman, Clemson Agricultural College 1936-1944; Associate Professor of Dairy Husbandry at Kansas State College 1944-1947; Assistant at Iowa State College 1947-1949 and since April 1949 Professor of Animal Industry at North Carolina State, in charge of the nutrition section.

During student days he was characterized by the thoughtfulness of his preparation in both study and research work. Since completing his graduate study he has continued to exhibit those same qualities in his research activities. An important contribution made by Dr. Wise was his series of comprehensive studies upon the physiology of gastric digestion in the calf. These include the various factors affecting the passage of liquids into the rumen of the calf and the changes in milk products that took place when milk was slam-fed. His more recent studies include the effect of the preparation diet of the cow on the vitamin A and tocopherol content of colostrum and milk in the early post-colostrum period and upon the vitamin A storage in the new born calf. He received the American Feed Manufacturers Association Award in 1948 for his series of publications on the latter work.

Dr. Wise has been active in the American Dairy Science Association, having served as chairman of the Production Section in 1948 and Associate Editor of the Journal of Dairy Science. In 1964 Dr. Wise was Vice President of the American Dairy Science Association and succeeded to the Presidency in 1965.

It is with pleasure that the AGRARIAN presents this profile of an outstanding Clemson alumnus.

Forestry Club News

The Forestry Club at the present time is cutting pulpwood in order to go to the regional conclave of Forestry Clubs which will be held at N. C. State College at Raleigh, May 1, 1965. This represents much time and effort as well as planning by the host club. Events include dendrology, wood technology, and other technical events as well as the standard field events of log burling, axe chopping and sawing. Proficiency in these events is necessary in order to win in the regionals and a local conclave is held in order to select the best trained boys. This local conclave is to be held April 9, 1965 and will include a banquet and club initiation as well.

AG COUNCIL NEWS

The Agricultural Council has made several recommendations to Dr. Jones' office this year. One of the suggestions concerned the formation of an Agricultural Social Fraternity. It was the unanimous opinion of the group that such an organization can serve a useful purpose on the Clemson Campus.

Another suggestion pertained to the lack of knowledge of requirements which must be met by all student organizations. The Council recommended that an attempt be made to make all club presidents aware of their responsibilities in this area. The suggestion was sent through Dean Wiley's office to the Student Senate.

On April 3, 1965, the Agricultural Council held its first annual banquet. A very nice steak supper was served to the group at the El Dorado Restaurant. Dr. and Mrs. Stembridge, Dr. and Mrs. J. W. Jones, and Dr. and Mrs. W. H. Wiley were guests of the group and Dr. Wiley was the speaker. There were about 25 people in attendance, including wives and dates of the members.
Creep-Feeding Beef Calves
WILLIAM J. RUFF, Animal Science, '65

In recent years there has been an increased interest among commercial cattlemen as to the advisability of creep-feeding beef calves—that is, provide a grain ration to suckling calves in an enclosure accessible to the calves but not to their dams. The increased interest has resulted in several experiments to study the value of creep feeding. Studies have been conducted at the South Carolina Experiment Station over a five year period to determine the feasibility of creep-feeding calves. Research has been conducted with over 800 Angus and Hereford calves at the Clemson and Coast stations and is being continued at the present time. Preliminary figures indicate an average increase in gain resulting from creep-feeding of 30 pounds. Also, average daily gain was increased from 1.66 to 1.79 lbs. with an improvement in grade of one-third. Animal Scientists at the Oklahoma Experiment Station, as well as many other experiment stations, report similar results.

Research has been conducted at the Oklahoma Experiment Station to study the value of creep-feeding steers and heifers to be sold at weaning or followed by dry-lot fattening for the steer calves. An experiment was also conducted with calves whose dams were two years old when they calved.

Creep-feeding consistently produced fleshier calves at weaning. The average increase in gain resulting from creep-feeding was 30 pounds. An average of 363 pounds of feed was consumed per calf. The value per calf minus the feed cost was in favor of not creep-feeding when the calves were sold at weaning as stockers or feeders. However, creep-feeding would have increased profits if the calves had been sold for slaughter at weaning. Creep-fed calves may in many instances actually sell for less per hundred weight as feeders than the same quality of calves not creep-fed. Unless the creep-fed calves are continued on a high level of feed they will lose the extra condition and bloom obtained with creep-feeding. Many cattle feeders who desire to utilize fall pasture or simply winter their calves on a roughage program should not feed that it pays to buy calves with extra condition since they usually lose it when handled according to this plan. The added weight the feeder has to buy may only result in lower gains while in the feedlot.

Results at the Oklahoma Experiment Station indicate that it was more profitable to fall-feed fattening rations in dry-lot to steers which had not been creep-fed than those which had been creep-fed, when they were fattened to approximately the same slaughter grade. The creep-fed steers were marketed 19 days earlier than those which had not received supplemental feed. However, the fleshier creep-fed calves gained at a slower rate in the feedlot and at a slightly higher feed cost per 100 pounds of gain than the non creep-fed ones.

The results of creep feeding and wintering heifer calves showed the creep-feeding to be an unprofitable practice. The heifer calves which had been creep-fed gained an average of 37 pounds more during the summer than those which were not creep-fed. But those which had been creep-fed gained 33 pounds less during the winter feeding period than the non creep-fed heifers. Thus, the increased gain from creep-feeding resulted in decreased gains during the wintering period. Due to the added cost of feed for the creep-fed heifers the non creep-fed animals were more profitable.

The only experiment on creep-feeding calves at Oklahoma which proved to be profitable was the creep-feeding of calves whose dams were two years old when they calved. The reverse was true, however, when the cows produced their sec-
Forest Fertilization
RANDY BROOKS, Forestry, '68

Foresters of today are experimenting with fertilizers and organic nutrients to improve the forests, just as farmers use fertilizers to improve their crops. The natural forest circulates nutrients through the decomposition of roots, bark, limbs, and leaves on the forest floor, and the consequent uptake of these same nutrients by the roots. Through the neglect of man much of the organic layer from many forest areas has been removed. Poor agricultural practice, fire, and erosion are chiefly responsible for the depletion of humus in the forest. In such areas forest fertilization has brought very good results.

One of the major questions concerning the success of forest fertilization is whether or not the results obtained are worth the money invested. Conditions that often make fertilization profitable are low costs of application, low initial costs of land, and growth returns of a high enough magnitude to cover costs. Research will give us more information on the most profitable ways to make fertilization pay.

Improvement in wood quality and seed production are two of the most important goals of forest fertilization. Some scientists believe that the addition of plant nutrients improves sexual fertilization of trees, thus increasing seed production. As a result of fertilization, tracheid length and wall thickness are increased, thus causing a greater wood density, which is a desirable characteristic of wood. Increased seed production and better quality wood mean more trees at a better price.

Nutrients are used mainly on young seedlings, although they are also being tested on older trees. As a general rule, it seems that the older the stand, the less successful the fertilization. The reasons for this are that the growth of old trees has slowed to the point where they can no longer respond to fertilizers, and also the methods of measuring growth on old trees are crude. Seedling nurseries are the primary places where fertilization experiments are being carried out. The three principal elements in the fertilizers used are phosphorous, nitrogen, and potassium. These are mixed in varied proportions along with several minor elements in order to get the desired results. Tests are frequently made of nursery soils to determine which elements are deficient.

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Excess Chlorine In Flue-Cured Tobacco

SIDNEY FARMER, Agronomy, '65

Tobacco growers in South Carolina are becoming more aware of the problem of excess chlorine in tobacco. Excess chlorine gives an off-quality, off-type tobacco which is difficult to sell.

Chlorine is the latest element to become firmly established as an essential micronutrient for higher plants. In the tobacco plant chlorine may have decided effects on the growth and quality of the leaf when absorbed in sufficient quantity.

When the chlorine content of the green leaf rises to four or five per cent, normal carbohydrate metabolism may be seriously disturbed. The leaf becomes greatly thickened, exceedingly brittle, with a marked accumulation of starch, which will not convert to sugars in the curing process. Also, the leaf margins curl upward, and the leaf surface presents a distinctive sleek, glabrous appearance. Recently research was completed at North Carolina State University showing the effects of excess chlorine on tobacco. This tobacco was very striking in physical appearance. It was sunbaked on the bottom of the plant and immature in the middle part of the plant. This sunbaked tobacco, when cured, may be described as being muddy, or showing uneven color. Immature tobacco, when cured, will have a distinctive slick shiny appearance. Also, excess chlorine is believed to be responsible for the sort of leaf commonly known as "wet dog," a product which continues to darken and develops an undesirable odor after having been redried and packed in the hogshead for aging. Usually this sort of leaf comes from the lower part of the plant.

A small amount of chlorine is advantageous to the growth and quality of the leaf, and causes no apparent injury to the burning qualities. The principal effect of chlorine in the growing leaf is to increase the water content and turgor of the cells, which produces a larger, smoother, thinner leaf. This increased water content and turgor often functions in preventing necrosis in the leaf due to drought, the more usual form known as "drought spot." On light soils of low water-holding capacity, this protective action may result in adding materially to the commercial value of the crop. The effect of a moderate amount of chlorine in the tissues in inducing the development of a leaf having a greater spread, lighter green color, and smoother surface may be attributed to the drought-resistant properties imparted by the chlorine.

The adverse effects of excessive chlorine were vividly demonstrated by research conducted in 1964 by the North Carolina Agricultural Experiment Station as shown in Table 1.

<table>
<thead>
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<th>Fertilizer Cl</th>
<th>Yield</th>
<th>Ave. Price</th>
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<td>dols/cwt.</td>
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<td>2257</td>
<td>50.98</td>
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</tbody>
</table>

At 50 and 120 pounds of chlorine per acre the average price of the cured leaf was reduced seven and eleven per cent below that at the 30 pound rate. Also, with rates above 30 pounds per acre the color, texture, and other characteristics were considered extremely undesirable by domestic and export tobacco companies.

Similar research at the Pee Dee Experiment Station, Florence, South Carolina, indicates that chlorine in excess of 30 pounds per acre is detrimental to the physical and burning quality of tobacco. The higher chlorine rates produce a more hygroscopic tobacco.

To help reduce excessive chlorine in tobacco, the Agronomy Department at Clemson is asking the fertilizer manufacturers in South Carolina to voluntarily reduce the chlorine in both complete and side-dressing tobacco fertilizers, so that it does not exceed two per cent. Previously the chlorine content in complete fertilizers ranged up to three per cent, and in the side-dressing fertilizers the chlorine content was as high as five per cent. The tobacco fertilizer can very easily be a source of excessive chlorine for the plant.

In addition to the chlorine furnished in tobacco fertilizers, the chlorine supplied to the soil by soil fumigants must also be considered. Research conducted at North Carolina State University has shown that additional chlorine and/or (Continued On Page 14)
Student Teaching In Vocational Agriculture

HUGH CALDWELL, Agricultural Education, '65

Why do Agricultural Education majors look forward to their spring semester of their senior year? There are two possible reasons: first, it is the final semester in college for many of them, and secondly, and probably most important, it's the time they get their first experience in teaching.

The first eight weeks of the second semester is a block schedule at an accelerated rate. During this period courses in Music Appreciation, Health Education, and Agricultural Education are taken. During this time students learn the theories of education, collect teaching materials, and make lesson plans. Then comes the eight weeks of the real thing—"Directed Teaching."

For the actual teaching experiences, the students divide up into pairs. Each pair goes to a school or training center for their directed teaching. Their training in these centers is supervised by the local Vocational Agriculture teacher, known as the supervisory teacher, and by the Agricultural Education staff at Clemson University. There are twenty training centers in various sections of the state. These schools are used on a rotated basis rather than used continuously. The ones to be used this year are: Conway, Indianland, Loris, McBee, Pelion, Pendleton, Saluda, Southside (Florence), Wade Hampton, and Wagner. Other schools which have been used include: Allendale, Bells, Crescent, Daniel, Darlington, Fort Mill, Hollywood, Pickens, and York.

The first week of the student teaching period is largely one of observation, planning, and learning the school, its administration and some of the people of the community. Beginning with the second week, the student teachers usually take definite responsibilities with both in-school and out-of-school classes.

Teaching assignments include various types of classes, such as, classroom, field, and shop. Visiting farm people, adults and boys, is definitely a part of the program. Much of this is done in the afternoon after classes are over.

The purposes of these visits are to become more familiar with the in-school students as well as their parents, to learn the farmer's needs, and to make farm surveys. Evening classes are conducted also with the young and adult farmers.

It is a period in which student teacher learns by doing. They have the opportunity to observe others teach and teach before others. Although this is a busy period, all of the student teachers enjoy it, and develop considerable enthusiasm about teaching.

(Continued From Page 2)

FFA

After he returned he gave a brief summary of the activities of the convention.

On November 19, 1964, a Leadership Training Program was presented by members of the Clemson FFA Chapter. The purpose of this program was to help train high school FFA officers in their duties as officers. Also their local chapters program of work was discussed. Officers from eight schools in Pickens, Oconee, and Anderson Counties attended.

Wayne Coward, Vice President of FFA chapter, represented Clemson University at the Youth Day Program held at the State Fair in Columbia.

Dr. A. K. Jensen and Hugh Caldwell were guests of the Spartanburg Federation annual Father-Son banquet on February 22, 1965.

Each year the Collegiate Chapter has its annual banquet in the spring semester. This year it was held on March 11, 1965, at the Southerner Restaurant. There were 49 members of including the Agricultural Education staff and their wives, Dean and Mrs. W. H. Wiley, and Dr. and Mrs. J. W. Jones. Dr. U. S. Jones, Head of Agriculture and Soils Department at Clemson University was the guest speaker. Each year at this banquet, achievement awards are given to the outstanding Junior and Senior in the FFA. Receiving these awards for 1964-1965 year were: Junior — Jim Barnette, and seniors — Al Berry and Hugh Caldwell.

On March 2, 1965, new officers for 1965-1966 were elected. These officers elected are: President—Jim Barnette; 1st Vice President—David Coile; 2nd Vice President—C. E. Poinexeter; Secretary—Steve Logan; Treasurer—Thomas King; Reporter—George Gore; and Sentinel—Larry Smith.

HUGH CALDWELL

NINE
The Rumen And Its Functions

GENE MERRITT, Dairy Science, '66

As a cow takes food into her mouth she chews it and compacts it into three or four ounce wads called boluses. Upon the formation of a bolus, it passes down the esophagus to the rumen.

The rumen is one of the most important sections of a cow’s digestive system. This compartment has a capacity of approximately fifty gallons, or as much as three hundred pounds of material. The rumen has three main duties with interrelated functions.

The first function of the rumen is to act as a storage place. The rumen holds all the feed taken in by a cow when she is fed or when she grazes. After she has finished feedings and is resting, she regurgitates the largest particles back to the mouth, to grind them more completely.

Next, the rumen is able to refine coarse food. The rumen is made up of muscular membrane covered with many pointed papillae and half filled with water. Due to the action of these forces, the feed is soaked, churned about, and returned to the mouth for further mastication. Thus, by churning, soaking, and rechewing, the particles are greatly reduced in size for better action of digestive juices and bacteria.

The third function of the rumen is to provide a place for fermentation. During the twelve hours that the feed stays in the rumen, many important changes take place. These changes are brought about by the action of bacteria and yeast. The temperature, food, and moisture of the rumen are so combined as to provide ideal conditions for growth and multiplication of these organisms.

(Continued On Page 18)
Pre-Veterinary Club News

The spring semester is a period when the upperclassmen in Pre-Veterinary Medicine anxiously await official news of whether or not they have been accepted to the School of Veterinary Medicine. This is the time for aptitude tests, interviews by a team from the School of Veterinary Medicine, and finally hoping for a letter of acceptance from the school.

The Pre-Veterinary Club sponsors each year a trip for the upperclassmen to the State Livestock - Poultry Disease Diagnostic Laboratory in Columbia. This was a very interesting trip this year. The students had an opportunity to hear Dr. Boyd, Director of the Laboratory, outline the lab program and then the students were taken on a tour to see the various functions performed in the lab. On April 2 the students visited the School of Veterinary Medicine at the University of Georgia for the annual “Open House.” This proved a most valuable experience as it gave the students an insight into the school and also allowed some time to discuss some of the aspects of Veterinary School with the professors and students. On March 23 two former Clemson Pre-Veterinary students now enrolled in the School of Veterinary Medicine presented a very informative talk at the club meeting. It has been a practice of the club to have some of the former Clemson students speak to its each year. The annual banquet is scheduled for April 27.

All students interested in Pre-Veterinary Medicine are invited to become a member of the club.

DENNIS B. VOSO

PARTNERS IN AGRICULTURE!

For 50 years, we have been partners with Clemson in providing better feeds and feeding programs for the farms of South Carolina. . .

To Clemson men of today, we say: We hope to serve those of you who will manage the South Carolina livestock and poultry farms of tomorrow!

Spartan Grain & Mill Company
Spartanburg, S. C.
Newberry, S. C.

Ag Econ Club News

This semester, the Agricultural Economics Club has been very active, not only in Club business, but also in the area of speakers at our meetings. Agricultural Economists, Dr. L. E. Talbert and Mr. D. E. Crawford spoke to us on the importance of Economics in Agriculture. Fellow Club member Gene Dukes gave us chosen excerpts from a speech he gave at the American Farm Economic Association public speaking contest, Purdue University, Lafayette, Indiana.

At our meeting on the 10th of March, American Farm Economic Association certificates were given to all members. This is the first time that the Club has offered a membership certificate of any kind.

At one of our bi-weekly meetings, the members voted on, and passed, a motion to have a candy sale. The candy was distributed among the members, who have done an outstanding job of selling it. At the completion of the sale, the club will have realized a profit of $33.00. The candy sold so well that Club President Marshall Dantzler is considering another sale.

All activities of the Ag. Econ. Club for the remainder of the semester will be directed toward the publication of its annual brochure recognizing its seniors and graduate students, and its Annual Student-Faculty Banquet held on the Friday night of Junior-Senior dance weekend. The purpose of this banquet is to promote good relations between the students and the faculty. The Members of the Club and their dates are looking forward to an enjoyable evening with the faculty and their wives.

FRANCIS L. KAPP

Investor-owned SCGECO maintains an Agricultural Development Department composed of college-trained Agricultural Engineers. This is one of its “friendly” services for better living, and, in this case, better farming, too.
ALVIN NELSON BERRY

Al Berry, an Agricultural Education major, is from Ward, South Carolina. He attended Saluda High School where he was a member of the Beta Club and played football and basketball. He attended Furman University for one year and played football there. At Clemson Al has been a member of the Pershing Rifles and the FFA of which he served as Treasurer and Chairman of the FFA Calendar Committee. He was also elected to membership in the Alpha Tau Alpha and Alpha Zeta Fraternities. He has maintained a cumulative GPR of 2.7. Al is doing his practice teaching this semester at Wagener.

DANIEL DAVID BOZARD

Dan Bozard is a native of Orangeburg and a graduate of Orangeburg High School. He is an Animal Science major. While in high school he was quite active in his local and county 4-H Clubs and won a trip to Chicago. At Clemson, he has been a member of the Block & Bridle Club for four years, has served as its secretary and is presently serving as President. He is also serving as Vice-President of the 4-H Club and Vice Chairman of the Ag Council. He participated on both the livestock and meats judging team. Dan has maintained a 2.33 cumulative GPR and was elected to membership in the Blue Key National Honor Fraternity.

LOREN JOHN BROGDON

Loren Brogdon, a Horticulture major, is a native of Little Silver, New Jersey. As a freshman he received the Danforth Freshman Award. He is a member of Phi Eta Sigma, Phi Kappa Phi, Clemson Glee Club, Arnold Air Society and Scabbard and Blade. He has served as Secretary of the Horticulture Club and is presently serving as Scribe of Alpha Zeta. Loren has maintained a 3.3 cumulative GPR and was designated a Distinguished Air Force ROTC Cadet.

MRS. LINDA JONES MAN

Linda Marghanian is a native of Hills, California. Before entering her sophomore year, she had taken two years at the University. During the year she worked on her Biology this May and at the same time completed her requirements in education certificate. She has worked as assistant for the past two years as secretary of the Biology Club. After work and school she keeps house, where her husband and is active in the Presbyterian Choir. Linda has maintained a cumulative GPR of 3.88 and plans to work towards a degree in Zoology next year.
JOE FRANKLIN SHEALY

Joe Shealy is a native of Saluda, South Carolina and graduated from Saluda High School. He served several years in the U. S. Marines before enrolling at Clemson in Forestry. His freshman year he received the Carolina Ginners Association Scholarship. Joe has served as a Hall Supervisor for two years. He is a member of Gamma Sigma Delta and is presently the President of the Forestry Club. He is a member of Alpha Zeta and is serving as treasurer. He is also Reporter of the Ag Council. Joe has maintained a cumulative GPR of 3.32.

SHULER HILLER HOUCK

Shuler Houck, a Dairy Science major from Cameron, South Carolina, is specializing in the Production option. He received the Ralston Purina Scholarship for 1964-65. He is a member of the Lutheran Student Association, Alpha Zeta, and the Ag Council. He has served as Vice-President of the Dairy Club and Business Manager of THE AGRARIAN. In addition he was a member of the Dairy Cattle and Dairy Products Judging teams. Shuler is married to the former Olivia Heape of Fort Motte, and has maintained a cumulative GPR of 3.0. He was recently elected to membership in Gamma Sigma Delta.

JAMES CARLYLE WILLIAMS, JR.

Jimmy Williams, a Dairy Science major, is from Norway, S. C. He received the Gamma Sigma Delta Sophomore Award, the Danforth Award for Agricultural Seniors and the Borden Agricultural Scholarship Award. He has been elected to membership in Phi Eta Sigma, Phi Kappa Phi, Gamma Sigma Delta, Tiger Brotherhood and the Blue Key Fraternity of which he is Secretary-Treasurer. He has served as President of the Dairy Club, Chairman of the Ag Council, Chancellor of Alpha Zeta, and Editor-in-Chief of The AGRARIAN. Jimmy is a member of the Clemson Aero Club, is listed in both the 1963-64 and 1964-65 Who's Who in American Universities and Colleges, and is also serving as President of the National Student Branch of the American Dairy Science Association. He has maintained a cumulative GPR of 3.62.
bromine is added to the soil in most of the fumigants applied to control nematodes. While the effect of these nematodes on the chlorine content of the leaves will vary quite widely, a reasonable estimate is that in many situations and with chlorinated hydrocarbons it will amount to the equivalent of 20 lbs. of chlorine per acre. Thus, the quantity of chlorine applied even at minimum rates of fertilizer for tobacco may exceed the recommended level, and at the higher rates of fertilizer which are frequently applied, it may be several times more than is considered advisable. As an example, the application of 900 pounds of 4-8-12 plus 200 pounds 8-0-24 to fumigated soils probably supply the equivalent of about fifty pounds of fertilizer chlorine. Under present fertilizer applications by tobacco growers, the rate of chlorine probably exceeds sixty pounds per acre on most fumigated soils.

In fertilizer, the demand for high rates of potassium, which gives good-burning quality to the leaf, along with the chlorine restriction has necessitated that a large part of the potassium in tobacco fertilizers be obtained from potassium sulfate and potassium-magnesium sulfates. Both of these materials contain considerable sulfur, and do ordinary superphosphate and ammonium sulfate, which are used in fertilizer formulations. The sulfur content of current mixtures used for fertilizing flue-cured tobacco is from twenty to thirty per cent SO3, equivalent, and the rates applied to a given crop are frequently equivalent to three hundred to five hundred pounds of SO3 per acre. Research at North Carolina State University has shown that sulfur equivalent to seventy-five to one hundred pounds per acre of SO3 is generally sufficient, with the higher rates being associated with a slower burning, denser tobacco.

Taking sulfur and chlorine into consideration potassium nitrate is of considerable interest as a material for flue-cured tobacco. A distinctive feature of potassium nitrate, besides being a source of potassium, is the very low content of chlorine and sulfur. Since soil fumigants used for the control of nematodes reduce the rate of conversion of ammonium to nitrate nitrogen, potassium nitrate supplies the nitrogen in the nitrate form. It is now recommended that fertilizers for flue-cured tobacco contain at least thirty-five percent of the nitrogen in the nitrate form because of the soil fumigants that are widely used.

Tobacco growers in South Carolina should carefully analyze their fumigation and fertilization programs to attempt to hold the application of total chlorine on the tobacco crop to a minimum for high quality tobacco.

Poultry Science Club News

At the first March meeting, the Club decided to invite Mr. Stan Marshall of Marshall's Poultry Farm to speak at the next meeting. Mr. Marshall accepted the Club's invitation and spoke to the group on March 22. He made a very informative talk on "The Opportunities of a Poultry Science Graduate."

The Club is planning to make a weekend trip to visit various poultry installations throughout the state. Both broiler and egg producing areas will be visited. The group intends to make on-the-farm tours as well as seeing the processing plants used in poultry production. Such a trip should enable the students to become better acquainted with all aspects of the poultry industry.

Here's a household hint on how to tell whether or not your goldfish is a boy or girl. "To the H2O add ½ ounce of H2SO4. If he comes floating to the top, he's a boy. If she comes floating to the top, she's a girl.

A city girl telling friends about her brother-in-law's farm said, "It's one of these experimental farms where the cows have calves without any bulls around. They call it artificial inspiration."

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- Feed processing  •  Frost protection of piping
- Heating for form buildings; form homes; hot houses; plant beds
- Lighting for poultry houses, form buildings; green houses
- Outdoor lighting  •  Material handling, including conveyors, augers, elevators
- Pig brooding  •  Silo unloaders  •  Water systems
- Water warming  •  Interior and exterior wiring, including center-pole metering

Details on these and other services, designed to help you live and farm better electrically, are available at any Duke Power office.
A DREAM

(Continued From Page 3)

cated in the close proximity of the existing green-
house and other plant growing structures is a
lecture area which will be shaded by pines and
surrounded by beautifully blooming shrubs.

As far as fruits and vegetables are concerned,
a section has been designated to contain various
species and varieties of fruit trees, shrubs and
vines including commonly known and unusual
types. The herbaceous material has been laid
out in a semi-formal design interlaced with walks
and surrounded by fruiting shrub species.

Featured across the pond, which is inhabited
by a flock of ducks for public interest, is a Japa-
nese-style tea house to add a touch of the Orient
to the atmosphere. A collection of bamboo has
been placed in this area which is to be laid out in
typical Japanese fashion. A small bamboo bridge
will span a narrow segment of the pond which
will be enveloped by iris and azaleas planted
along its banks. Cypress trees planted in the edge
of the pond will add to its reflective beauty.

Surrounding the pond is a stand of pines
underplanted with camellias, azaleas and rhodo-
dendrons with a series of trails winding through-
out this segment. Also included under these pines
are hardwood trees including dogwood, sourwood,
redbud and sweet gum — chosen for their fall
colors.

In conclusion, the ball is now rolling and the
"Ornamental Grounds" are rapidly being devel-
oped. We in the field of horticulture are proud
of our profession and we are proud to play the
important role in the beautification of America.
We hope that as these grounds are developed the
residents of South Carolina will come to enjoy the
area and, in so doing, acquire a deeper apprecia-
tion for Horticulture.

Biological Science Club

This article is for the reading of non-members.
This article is to point out what you have
missed, because you did not join the Biological
Science Club.

Non-members, you have missed one of the
most entertaining and factual talks about snakes.
This was a very informative program presented
by a non-professional herpetologist, Mac Shealy.
In addition, you have missed a lecture dealing
with Egyptian Agriculture, which was also ac-
accompanied by an entertaining film. A very spe-
cial lecture and movie about the work of the
Peace Corp in Nepal was also missed by non-
members.

Besides these interesting topics we have also
had many revealing movies and discussions deal-
ing with wildlife, their habitat, and their rela-
tionship to man.

We anticipate programs dealing with more
and more interesting and very educational topics.

We extend a challenge to all non-members:
Are you man enough to try it? 

Jim Griffin
Poultry Meat And Eggs Are More Than A Bargain

NELSON E. McLOUGHLIN, Poultry Science, '65

The food industry has in the past few years made tremendous strides in building particular types of foods for the consuming public. Why should we consider poultry meats as a substitute for other meats? In addition to convenience and appearance factors in a meat product, we logically eat for the nutritional value. Because of the high nutritional value of poultry meat, it is one of our most useful food items. In general composition, poultry meat closely follows figures for beef or lean pork. At the present time, there is much emphasis placed on the fat content of the diet. In addition, we hear a considerable amount about the degree of saturation of the fats. Chicken fat from birds fed the usual commercial diets will usually fall about halfway between beef fat and corn oil products with regards to degree of saturation.

With respect to amino acids, poultry meat has been found to be extremely rich in lysine which is a limiting amino acid in many of our vegetable proteins. Because of the high nutritional value and particularly because of possibilities with regard to low fat and presence of unsaturated fat in poultry meat, they can be used in many places in the diet where usual animal products would not fit as well. For these reasons newer, more convenient poultry meat products are being offered to the American consuming public.

Let us consider eggs also at this point. Eggs are one of the most nutritious and versatile of our food products. They are used in appetizers, entrées, beverages, and desserts. They are used in warm foods, chilled foods, and frozen foods. They are available as shell eggs, liquid eggs, frozen eggs, and dried eggs. They are used for hundreds of purposes as in soups, custards, sauces, breads, meats, mayonnaise, candies, ice creams, noodles, flavoring, and such non-food uses as adhesives, leather industries, and many others.

Seeing the importance of poultry products in the American diet, let us consider these products as bargains to the consumers. Poultry meat and eggs have been introduced and promoted to fit the real consumer need and to fit into all economy sectors of the consuming population. Bargains come to the consumers as lower prices. Lower prices are due to increased specialization and production technology within the poultry industry. Bargains are hard to measure, however, in terms of money. Convenience in the preparation of meals, nutrition received from the product, satisfaction with the product, and time saved are just a few of the "bargains" the consumer may receive.

Today, about 37% of the food consumed in the nation is professionally prepared and served. There has been a 27% increase within the past 20 years. There are many reasons for this, such as increased travel for business and pleasure, increased school feeding, rapid rise in incomes, and longer livability that has created a large, almost exclusive "eating out" class of people that represents today more than 10% of the total population of the country.

Poultry products fit into the consumption picture quite well as a low price, quality foodstuff. To meet the demands of the public new forms of poultry meat and eggs are put on the market. These include frozen omelets, frozen egg sandwiches, instant dry egg nog, pickled eggs, junior baby foods, aerosol egg foam, egg chiffon pie, "Warm 'N Serve" chicken, and many others.

With the tremendous increase in population, poultry meat and eggs will enter into the population's diet to an even greater extent in the future.

Do you know we've had news censorship ever since Adam and Eve? Or do you really believe Eve tempted Adam with an apple?

"Do you know why traffic lights turn red?"
"No, why do they?"
"You'd turn red, too, if you had to stop and go in the middle of the street."

A kiss is a mouthful of nothing that tastes like heaven and sounds like a cow pulling her foot out of deep mud.
AGRICULTURE
(Continued From Page 4)

During the latter part of the 19th century, agrarian discontent gave rise to the movement to dispel corruption from our government. During this so-called "Progressive Era," which extended to the first World War, several movements born on the farm were incorporated into legislation. Some of the most notable of these movements were the direct election of United States senators, a national income tax, a tariff revision, and programs aimed at the conservation of our natural resources.

This brief glance at the past is given to show that the farmer has been instrumental in the building of the great America we know today. Agriculture's past record is one of progress and satisfaction, but today the farmer is faced with a new and more challenging situation than ever before. The farm population today makes up less than 8 percent of our total population, and experts are predicting that our population will reach 225 million by 1975. With the agricultural population continuing to decrease it will take a renewed and vigorous effort on the part of everyone connected with agriculture to furnish these future Americans with the food, clothing, and other agricultural products that will be demanded.

Agricultural research must continue to explore and investigate ways of making production and marketing even more efficient; not only will a large quantity of agricultural products be needed, but the quality of these products must conform with our ever increasing level of living.

The American farmer, a manager of a complete business, must strive to improve his ability as an entrepreneur. He must always be conscious of new techniques that are being developed and of the changes that are taking place around him. His farming program should be flexible to allow him to make changes and adjustments with a minimum of expense and time.

The farmer must realize that he is dealing in a world of specialization and big business, and he must seek ways to deal on favorable terms with these operations. The farmer of tomorrow will have to know how and when to use credit. He will have to know when to specialize and when to diversify his farming operation in order to operate as efficiently as possible.

The shifting of the population from rural areas to urban areas, and, subsequently, the Supreme Court ruling in Baker versus Carr, which decreed that states would have to realign their political districts so that rural and urban representation in government would be equal, has put the farmer in a new political situation. Agricultural voices in our state and national governments will be fewer in the future. Some of the key positions now maintained by leaders of agricultural interests probably will be manned by urbanites in the near future. If the farmer is to maintain a strong voice in our future political decisions, then farm leaders will have to be clear and concise in the analysis of rural problems.

Whither Now?

"The average age of the world's great civilizations has been 200 years. These nations progressed through this sequence:

From Bondage to Spiritual Freedom
From Spiritual Freedom to great Courage
From Courage to Liberty
From Liberty to Abundance
From Abundance to Selfishness
From Selfishness to Complacency
From Complacency to Apathy
From Apathy to Dependency
From Dependency back again into Bondage"

In thirteen years our United States will be 200 years old. Can you define our status today? Where will you be tomorrow?"

conscious of developments in both rural and urban areas, and continuously searching for ways to strengthen the farmers' economic position and, simultaneously, the economic position of our economy as a whole.

The future probably will place even more and tougher obstacles in the farmers' path, but if the past is any indication, and I think that it is, the farmer will find some way to dissolve the obstacles and continue to do his part in building America.

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and
Russellville Flooring Company
SUMTER, S. C.

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773-9311 Area Code 803, Sumter, S. C.
Agronomy Club News

The Clemson Agronomy Club has kicked off the new year with the usual election of officers. They are: President—Tommy Cordray, Allendale; Vice-President — Jimmy Vaigneur, Ridge-land; Recording Secretary — Tommy Hardaway, Dillon; Treasurer—David Ledbetter, Williamson; Corresponding Secretary—George Bryan, Allendale.

Dr. M. B. Boling has been chosen by the club to be our new Junior Advisor, serving with Dr. C. E. Bardsley, who moved to Senior Advisor.

A full slate of activities has been planned including work projects for raising money as well as entertainment for the club. Activities include an Exchange Day with the University of Georgia Agronomy Club, at which time the Clemson Club will visit the Georgia campus with the purpose of exchanging ideas and information concerning club activities.

The Clemson Club is planning to visit a copper mine in Tennessee which will be both entertaining and informative.

Our annual Awards Day Banquet will be given in honor of the graduating seniors. This will consist of a steak supper at which the club members will bring guests, and at this time scholarships and awards will be presented to outstanding agronomy students.

We are looking forward to a most successful year with our increased membership and full participation in our activities by all of our members.

GEORGE E. BRYAN, JR.

THE RUMEN
(Continued From Page 12)

These organisms in themselves have three main duties.

The first function of the organisms is to secrete enzymes which soften and disintegrate rough feeds and bread down to starches and cellulose. This action of the organisms on cellulose produces organic acids, the final aim in digestion when the material is not too mature having a high lignin content. These organic acids, mainly acidic, propionic, and butyric are absorbed through the rumen wall directly into the blood stream.

Secondly, the organisms build complete proteins. The bacteria and yeast may thrive on non-protein, nitrogen-containing substances. Thus, they build protein from non-protein substances, and when they die they are digested by the cow as a source of protein. Since much of the dietary protein is broken down, assimilated, and resynthesized into bacterial protein, it is not necessary to provide the same quality of protein as is necessary for monogastrics.

The third function of the rumen organisms is to produce various B-complex vitamins. The dairy cow need not be fed these B-complex vitamins as such since the organisms in the rumen can manufacture them. In the digestive system of the cow, she is able to absorb the vitamins from the bacteria into her blood stream which are then available for body processess or for inclusion in the milk.

In the fermentation process, large amounts of gases are produced. If the cow is not able to pass off the gases by the reflex action belching, bloating occurs.

Thus, we can see since that portions of the feed are digested and the remaining feed is prepared for further digestion in the rumen. Hence, any way that we might aid the rumen by feeding correct feeds, we can speed up the work of the rumen and have healthier cows with a higher ratio of feed conversion to milk. This, then, logically gives us the reason for large warranted amounts of rumen research being carried on.

Modern art: A scared Guernsey cow backed up against a canvass.
The Backbone Of Agriculture

JIMMY WIGGINS, Agricultural Engineering, '66

Mechanization of agriculture has had two main objectives throughout time: 1) to increase the productivity per worker, 2) to change the character of farm work, making it less arduous and more attractive.

As a power unit, man physically is very ineffective and inefficient. He is capable of approximately 0.1 hp. of continuous output. Because of man's ineffectiveness and inefficiency, agricultural engineers have been faced with the problem of substituting machines for men. Some might argue that this mechanization has been part of the cause for widespread unemployment in the United States today. But, without these modern methods which have replaced many field workers one man would still be producing only enough food to support 4½ people as he did 100 years ago. Today, thanks to modern machines, implements, and fuels, one man can produce on the average enough for approximately 25 people.

The word tractor has been attributed to various sources, but according to the Oxford Dictionary the word was used in 1856 in Great Britain as a synonym for traction engine. The term tractor appears in an 1890 U.S. patent for a truck-laying steam traction engine.

The early steam engines were stationary engines which produced only belt power and had to be moved from place to place behind mules or oxen. Obviously the next step was to convert the stationary engines into self-propelled ones. Successful steam plows were developed in the decade of the 1850's and continuous development occurred during the next 50 years.

The first tractors were plagued with many problems, but one of the foremost concerned traction. Attempts to solve this problem failed when inventors tried making the wheels and wheel base extremely large. One big-wheeled tractor in 1900 had two wood covered drive wheels, each 15 ft. wide and 9 ft. in diameter. The whole rig weighed 41 tons.

The need to reduce the number of men required to operate a steam engine stimulated early attempts to develop a gasoline engine. As farms grew larger so did gasoline engines. The tractors grew also. In 1925, there were only 549,000 tractors in the U.S. In 1961, there were 4,720,000.

While early engine designers had to compromise on designs to permit operation on distillate or gasoline fuels, today's designers can concentrate on securing the most efficient engine design specifically for one of three commercially available fuels — gasoline, diesel fuel, or liquid petroleum gas (LPG). The durability and versatility of modern tractor engines has been influenced by such factors as: design and placement of air cleaners, improvements in combustion chambers design, widespread use of exhaust valve rotators, chrome plated piston rings, improved cylinder blocks, valves, and bearings. The quality of modern gasoline has also had a marked effect on the improvement of engines and their designs. Gasoline antiknock properties have been increased thus increasing the total performance of gasoline engines.

In the last several years the compression ratios of tractors have increased with an increase in horsepower and rpm's. The reason for tractor engine compression ratios being less than automobile compression ratios is that a typical passenger car will produce its maximum horsepower at about 4600 rpm's, and with automatic transmission cannot operate at full load at speeds much lower than 1600 rpm's. On the other hand, a typical gasoline tractor engine is governed at some top speed (e.g., 2000 rpm), and often operates at full load at lower speeds. Since the octane number requirements usually are highest during full-throttle operations at low speeds—a condition that is eliminated in most passenger cars—the compression ratios of tractor engines are somewhat lower than the compression ratios in automobiles designed to operate on the same type gasoline. The performance of a gasoline engine is largely dependent on the antiknock quality of the fuel used in it—and how effectively the engine utilizes this quality. Gasoline tractors are usually designed to operate on the average regular grade gasoline available at that time. An advance in the ignition timing of four degrees increases the antiknock quality by approximately six numbers.

Gasoline antiknock quality is given as a whole number between 0 and 100. The number is actually the percentage of two test fuels combined to produce the same knock as the fuel being tested. Two fuels determine the octane scale, heptane which has a value of zero and iso-octane which has a value of 100 octane numbers. The test is made with a special engine developed by the Cooperative Fuel Research Committee. The octane number of the fuel being tested is the percentage of iso-octane in the mixture of the two fuels that has the same knock intensity as the fuel being tested. High octane rating is necessary for high compression, high performance engines.

The ignition quality of diesel fuel is determined by a method similar to that used in determining the antiknock quality of gasoline. In the case of the octane number scale, the scale of cetane number for diesel fuels represents blends of two pure hydrocarbon reference fuels. Cetane is a hydrocarbon with very high ignition quality, and was chosen to represent the top of the scale with a cetane number of 100.

Liquefied petroleum gas is commonly known to the trade as LPGas. It consists of propane and/or butane along with small amounts of other hydrocarbons. The boiling points of the various LPG fuels range from -127°F. Due to these low boiling points these fuels must be handled in closed pressurized containers. When LPG gas is used in an engine, pressure reduces and vaporizers are substituted for normal carburetion.
equipment before the fuel reaches the carburetor.

A comparison of the physical properties of these three tractor fuels is given in the table below.

It is not surprising that numerous fallacies concerning fuels and engines have become accepted by many people as facts. A few of the more common ones are listed below.

**fallacy:** High-octane gasoline will raise the operating temperatures of engine parts, therefore tending to cause the engine to “burn up.”

**fact:** Modern gasoline of both regular and premium grades have practically identical heating values, approximately 115,000 BTU/gal.

**fallacy:** High-octane gasolines are more dangerous than lower octane fuels.

**fact:** The ignition tendencies of a gasoline have no direct relation to its octane number.

**fallacy:** “High test” and “high octane” mean the same thing.

**fact:** “High octane” means that gasoline has a high resistance to knocking when burned in the combustion chamber of an engine. On the other hand, “high test” refers to the volatility or distillation characteristics of a gasoline.

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University tested. Conditions soil. Has no odor.
Will not burn. Response in 3 to 5 days.
Increases soil water holding capacity.
Makes conventional fertilizer more efficient.

Manufacturer:

**AMERICAN HUMATES, INC.**
Fidelity Union Tower, Dallas, Texas

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**fallacy:** Only premium-grade gasolines contain tetraethyllead for octane-number improvement.

**fact:** Today, over 99 per cent of all motor fuels sold in this country contain tetraethyllead.

These fuels given above have served us well in the past and will probably continue to provide us with much farm power in the future. But what other advancements are in store for fuels of tomorrow? Will tomorrow’s tractor power come from solar energy, nuclear reactors or fuel cells? The field of potential farm energy is a wide open one and the surface has only been scratched.

<table>
<thead>
<tr>
<th>Fuel</th>
<th>API Gravity Deg.</th>
<th>Weight lb/gal</th>
<th>High Heating Value BTU/gal</th>
<th>Cost Cents/gal</th>
<th>Number</th>
<th>Nominal Comp Ratio</th>
<th>Air/Fuel Ratio</th>
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<td>Butane</td>
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<td>15:5:1</td>
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<td>14:7:1</td>
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<td>61</td>
<td>6.12</td>
<td>124,000</td>
<td>18.5</td>
<td>93</td>
<td>7:4:1</td>
<td>14:7:1</td>
</tr>
<tr>
<td>Diesel</td>
<td>40</td>
<td>6.87</td>
<td>135,000</td>
<td>16</td>
<td>*40</td>
<td>16:6:1</td>
<td></td>
</tr>
</tbody>
</table>

* Cetane number

College is a four year loaf made from the flavor of youth, and the old man’s dough.

And then there was the tugboat that committed suicide when it found out that his mother was a tramp and its father was a ferry.
Activities From A To Z

Recently the South Carolina Chapter of Alpha Zeta initiated 18 new members. Academic excellence along with leadership and character are the primary requirements.

Alpha Zeta made an attempt at the start of second semester to organize a book exchange. While the volume handled was not large, the idea appears promising and will be continued next year.

Plans for the annual spring student-faculty initiation banquet are well under way. Mr. William L. Harrelson, South Carolina Commissioner of Agriculture will be the invited speaker.

After two years of traveling the South Carolina Chapter was host to the Third Southeastern Regional Conclave March 26-27. Representatives from five of the seven chapters in the Region met for discussion and work. The S. C. Chapter (located at Clemson) was voted the outstanding chapter in the region for the third year in a row.

Plans are underway for a Freshman Picnic sponsored by AZ to acquaint all freshmen in the College of Agriculture and Biological Sciences with the aims and activities of the Fraternity of Alpha Zeta.

The Hort Club Sweetheart, Miss Olis Brooks from Loris, Clemson's 1964 Miss Homecoming, received the title of Miss Rural Electrification at the annual beauty contest in Miami, Florida, on January 27. Olis also received two scholarships totaling $2500.

We of the Hort Club are looking forward to a fruitful and flowering school year in 1965-66, and we anticipate many new members in the up-

Hort Club News

The dates of January 21-February 4, 1965, marked the Eleventh Annual Meeting of the American Society for Horticultural Sciences Collegiate Branches. Those representing the Clemson University Horticulture Club were Dr. Gene E. Stembridge, Mr. J. P. Fulmer, Butch Ferree, Thomas Woodham, and Jennings Gainey. Thomas Woodham presented a paper on the Development of the Ornamental Research Area Landscaping Project, which is in progress here at Clemson, in competition for the J. B. Edmond Award. Tuesday night, February 3, at the annual banquet. Mary Delchamps from Auburn University was presented the J. B. Edmond Award for her paper on the Causal Agent in Leaf Spot Liriope.

On March 2, the Hort Club meeting was held and officers for the 1965-1966 school year were elected and took office on this date. Those elected were: President, Jennings Gainey; Vice President, Loren Brown; Secretary, Louise Carroll; Treasurer, Arthur Pfister; and Club Reporter, Ted Stephens. Dr. R. R. Rothenberger was chosen by the members to be the faculty advisor for the following school year. Robert Culp was appointed by the president as editor of the Collegiate Horticultural Newsletter.

On the club's calendar for the remainder of the semester will be a "juice session" for making grape juice to sell in the Agricultural Sales. The annual banquet has been tentatively set for April 27 at The Southerner with guest speaker Mr. T. C. Cummings of the Ti-Ti Peat Humus Company.

coming freshman class to expand our club.

TED STEPHENS

DAN'S SANDWICH SHOP
Clemson, S. C.

"Let Us Cater
Your Entertainments"
The Birth Of Alpha Gamma

During the spring of last year began the metamorphosis of a new social fraternity on the Clemson University campus. Danny Bozard, Gene Dukes, Sidney Farmer, Bobby Lanford, Gene Merritt and Jimmy Williams discussed the fact that there are only two national social fraternities which take their membership primarily from agricultural students. These fraternities, Alpha Gamma Rho and Farmhouse, were contacted and asked for specific information about their respective organizations.

These students again met and discussed the idea of the new organization when school reopened in September of 1964. Information from national organizations had been acquired during the previous summer and several alumni from each were contacted at Clemson. After thoroughly discussing this information it was finally decided that the fraternal organization would be patterned similar to Alpha Gamma Rho in the hopes that some day the Clemson fraternity may be allowed to affiliate with the national organization.

Officers for the new fraternity for the year 1964-65 were as follows: Jimmy Williams, President; Danny Bozard, Vice President; Dr. D. V. Chalupa, Dr. M. A. Boone, and Dr. W. C. Mickleberry were selected as faculty advisors. These three faculty members had all been members of the AGR chapter during their own college careers.

A constitution was drawn up and submitted to the Office of Student Affairs, where it was approved by the school administration. The constitution and petition for admission as an associate member was then submitted to the Clemson University Inter-Fraternity Council. On April 27, 1965 the Inter-Fraternity Council unanimously approved the application, and the Alpha Gamma Fraternity became a reality.

Wasting no time the group held a smoker for interested students who wished to become members, and this was attended by twenty-eight students.

After the original six students and the three faculty advisors had met several times, twenty-six students were selected as members, two of whom were in the original six and do not graduate from Clemson this year.

Plans are now being made for the fraternity members to move into the eighth dorm when the fall semester of next year begins.

The establishment of the Alpha Gamma Fraternity on the Clemson campus is a giant step forward for all concerned and it is our hope that the inter-fraternity system will be strengthened. This organization will give each of its members a more meaningful college life and will contribute greatly to the overall education of the individual.
SHADOWS AND TRUMPETS

"A business is but the lengthened shadow of the man directing it."

That being true, you will form an opinion of us in the manner in which we manufacture SUNI-CITRUS PULP—its quality, the service we give you.

Also you will judge us by the manner in which we solicit your business.

The flare of trumpets is the signal for the beginning of the opening parade at every circus performance. Some companies open with this type of sensational advertising. There hasn’t been any blowing of trumpets about our company and about what we are going to do. There won’t be.

We will tell you facts about SUNI-CITRUS PULP. We are trying to manufacture it so that it will be the best citrus feed.

During the coming season, we ask your cooperation in helping the Florida Citrus Feed Industry develop in a sound, fundamental, businesslike manner.

Suni Citrus Products Co.
HAINES CITY, FLORIDA

Makers of THEY MOO FOR MORE = Suni Citrus Pulp

Our family has been growing citrus in Florida continuously since 1908

TWENTY-THREE
Block And Bridle
Club News

The Clemson University Block and Bridle Club is active again, with the initiation of new members highlighting the first part of the Spring Semester. The new members began their initiation procedures on February 25, 1965, and were formally initiated into the club on March 2, 1965, following a club cook-out at the Food Industries Building.

On April 10th, the club will sponsor a live animal evaluation contest for members of the club. There will be awards given to the winners in both contests.

The annual banquet is planned for April 23rd at the Food Industries Building. Immediately following the meal, there will be a guest speaker to address the club.

The Block and Bridle Club will end this very successful year with the spring barbecue at the intra-squad football game. The date for this annual event is May 1, 1965. All students and faculty are invited to attend. Tickets will be on sale at the Little Gym.

JACK CHANDLER

CREEP-FEEDING
(Continued From Page 6)

ond calves. In light of these results it might be profitable to creep-feed calves from first calf heifers.

In conclusion, it appears that the creep-feeding of beef calves is not a profitable practice for the commercial producer.

A bachelor is a college graduate who didn’t have a car during his college years.

Investigation into these and other problems will eventually give answers to the questions that forest managers have been asking concerning the practical use of fertilizers in forestry operations.
START SOMETHING!

Throughout history
most great
civilizations that
have declined
were victims of
stagnation rather than
conquest.

Apathy,
indifference,
detachment
led to decay.

In our own country today
we find more people who
prefer the role of
spectator rather
than participant.

Whenever a problem arises,
the spectator asks,
"Why don't they do something."

They can't help the police
to maintain law and order.
You can!

They are not responsible
for the conditions of your schools.
You are!

They can't give your community good government.
You can!

Every civic group,
every business,
every sports club,
every good tradition,
every worthwhile institution
began with a need,
a vision
turned into reality by someone
alive, responsible
and innovative.

to the people who sit back and ask,
"Why don't they do something?"
we ask,

"Why don't you?"
TOBACCO GROWERS!

Don’t let hornworms turn top grade leaf into a low grade crop

Stop them with low cost TDE

Your best defense against hornworms and budworms is dependable TDE. Costs little and clobbers the worms. TDE formulations are easy to mix ... easy to apply. Read the label and follow directions.

Many fine TDE formulations are available from your dealer. Make sure you get reliable TDE in your tobacco insecticide.

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