MEMORANDUM

SUBJECT: Use of potassium nitrate in tobacco fertilizer.

OBSERVATION: It appears that the use of potassium nitrate increases the potassium content of the tobacco leaf, increases yield, and improves the smoking quality of the tobacco.

COMMENTS: Potassium nitrate is highly soluble and readily absorbed by the plant. The nitrate ion is readily assimilated and the potassium ion would probably combine with an organic anion. The potassium organic compound would be less soluble in the plant sap than the potassium nitrate. The lower solubility and the lowered potassium ion concentration in the plant would result in the absorption of a relatively large quantity of potassium.

Where relatively large quantities of chlorine are present in the plant, the potassium chloride would tend to maintain a relatively high potassium ion concentration in the plant sap. The high potassium ion concentration in the plant would tend to lower the intensity of absorption of additional potassium. Increasing the potassium content of the plant without increasing the chlorine should significantly increase the intensity of the absorption of carbon dioxide by the plant.

The increase in the availability of carbon dioxide for photosynthesis could result in higher yields and higher content of sugars and other carbohydrates, which improve the smoking quality of the tobacco leaf.

In wet seasons, and in some poorly drained soils, excess water may exclude soil air, which will result in inadequate soil aeration and a deficiency of available oxygen in the root system of plants. The oxygen in nitrate ions, liberated by reduction reactions within plants, may significantly increase the supply of available atomic oxygen for crop plants, particularly in the root system. A deficiency of oxygen in the root system is often a critical factor in crop production. However, this problem may be corrected by the application of adequate quantities of nitrate nitrogen.

H. P. Cooper

(Dr. H. P. Cooper is retired and was formerly Director of The Clemson (S. C.) Agricultural Experiment Station).

This memorandum is reproduced through the courtesy of Southwest Potash Corporation.
The Agrarian

TABLE OF CONTENTS

A Date With The Dean 2
Agrarian Philosophy 2
Ideal Meat-Type Swine Is The Goal 3
The Tool Shed 4
Bob And Dana — Clemson University Ag Students 5
Have You Considered A Career With The Clemson College Extension Service? 6
Chemistry In Fields Of Clover 7
Chemical Energy Weed Control 8
Pelleted Coastal Bermuda — New Feed For Southeast 9
Outstanding Seniors In Agriculture 10
Processing And Its Overall Effect On Agriculture 12
Changing Curriculum of Vocational Agriculture 13
Poultry In The Past And In The Future 14
Success And Service — A Profile of Dr. J. W. Jones 15
Milk Packaging In The Dairy Industry 16
Farm Of The Future 17
Fruit: A Potential Processing Crop For South Carolina 18
Freeze-Drying Of Foods 19
The Economic Importance Of Timber In The U. S. 20

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 cover design by Bob Upson shows the recently completed Clemson Agricultural Center, along with a drawing of the State of South Carolina showing the location of the Agricultural Experiment Stations.

Two buildings, along with ten greenhouses, make up the Agricultural Center located on the beautiful Clemson campus. These buildings are known as the Plant and Animal Science Building and the Food Industries Building, and together they help Clemson give to its students and the people of South Carolina a very modern program for agricultural teaching and information.

The Plant and Animal Science Building is a two-story brick structure containing over 175,000 square feet of floor space, and its rooms furnish classrooms, laboratory facilities, and office space for extension, research, and teaching personnel. The auditorium located at the front of this building seats over 300 people and is often used for lectures, conferences and other gatherings.

The Food Industries Building contains over 75,000 square feet of floor space and is a one-story structure. This building houses many processing laboratories that are used for both research and teaching. The dairy section features a milk bar where Clemson products are made available to students and the public.

The ten modern well-equipped greenhouses are used mainly by the departments of horticulture, agronomy and botany, and they furnish excellent facilities for student use.

Advertising Rates Free on Request —
All correspondence should be addressed to The Agrarian, Clemson University, Clemson, S. C.
Subscription free on request.

PRINTED BY PALMETTO PUBLISHING CO., ANDERSON, S. C.
A Date With The Dean

By Dr. W. H. Wiley, Dean of Agriculture

I know some fellows in the School of Agriculture who are looking forward to June graduation with mixed emotions. The seniors are feeling that it has been a long uphill climb for at least four years, and in one sense they will be glad when graduation is over. In another sense, now that they approach the end of that period of hard work, they look back on four of the shortest years of their lifetime, and rather hate to see it come to an end. In either case, congratulations to the seniors are in order, and mine are most hearty.

The juniors have the feeling that come graduation, they will have to assume the responsible role of next year's seniors and take their official places in various student organizations, and fill some vacated shoes. I would encourage the members of the junior class to approach these positions with a desire for the honor that goes with an office, and also with a view to making a real contribution to the organization, and through that organization, to Clemson College.

This brings me to my second thought. On July 1 when Clemson becomes Clemson University, the School of Agriculture will become the College of Agriculture and Biological Sciences. I have been asked from several circles what this will mean to students, alumni, to the people with whom we work in other Colleges on the campus, and to people whom we serve out in the State. On a factual basis, the new name will only properly describe the total function that presently exists in the School of Agriculture. It will indicate that proportion of the total university which agriculture constitutes under the new terminology. But deeper than that, there is an image which will be involved. This image will be whatever the student body and the alumni make it. The term may seem trite—it's used these days rather glibly—but nothing comes back from a mirror except an image. We can create a beautiful image through scholarly attainment, through high caliber thinking, through long range planning, through loyal and enthusiastic support, and through a continuing interest in Clemson’s agricultural program. But we can distort this image through a failure to accomplish any of the above actions.

As a third thought, I would like to take this opportunity to congratulate the staff of The Agrarian for a job well done, and I should like to encourage next year’s editorial staff to keep up the fine work.

Agrarian Philosophy

By The Editor

THE AGRARIAN wishes to recognize an organization on campus which is striving to be of benefit to the students in agriculture. That organization is Alpha Zeta, the honorary and service agricultural fraternity.

To promote better student-professor relationships, Alpha Zeta initiated a program of teacher evaluation during the first semester of 1963-1964. Five students were selected at random from each class taught in the School of Agriculture. These students were each requested to fill out a questionnaire consisting of twenty objective type questions, seal the questionnaire in a furnished envelope, and return it unsigned to Alpha Zeta. Alpha Zeta in turn distributed the completed forms to the respective professors. Each questionnaire was seen only by the student who filled it out and the professor concerned.

It is too early to determine the value of the teacher evaluation, but some professors have commented that they have acquired valuable points from the program; a very few, however, have expressed disapproval.

Organizations which attempt to be of service are to be commended, and THE AGRARIAN feels that Alpha Zeta, through teacher evaluation and other projects, is certainly being of service to Clemson, its students, and to agriculture.

Ag. Econ. Club News

By William G. Dukes

The Agricultural Economics Club at the beginning of second semester held a meeting to decide whether to continue their Campus Pac Campaign from the previous semester. The club decided to continue the campaign until April 1, 1964. Upon the completion of this campaign, the Agricultural Economics Club had raised approximately $125.

At our regular meeting on the 25th of February, a special program was planned. Dr. W. J. Lanham, head of Agricultural Economics and Rural Sociology Department, spoke on job opportunities in "agri-business." On the completion of Dr. Lanham’s speech, a movie entitled “Oceans Away” was shown. This movie was concerned with agricultural opportunities abroad. At the completion of the movie, refreshments, furnished by the wives of our faculty advisors, Dr. Spurlock and Dr. Steele, were served.

The activities of the Club for the remainder of the semester will be directed towards 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.
MEAT-TYPE SWINE IS THE GOAL
By Dan D. Bozard, Animal Science, '65

Meat-type or "fancy" pork that will please the consumer and will be efficient to produce is the goal of today's modern swine producers. Modern swine technology leads the way in the production of this new model of meat-type hog. In the last ten years the emphasis has been on the production of a pork product to suit the consumer and increase the prestige of pork. Some consumers have been lost because of the poor quality of pork which was produced only a few years ago.

The lean, meaty pork produced in the future will be one of the main factors which will contribute to the profit for the producers. A uniform meaty product will be easy to merchandise and should be more readily chosen by the selective consumer. This new product has a high nutritious value at a reasonable price.

What has recent research on the meat-type hog shown and how fast will the complete change take place? All indications are that it is possible to make rather rapid progress toward producing meat-type swine. For example, at the University of Tennessee Experiment Station, through various systems of breeding and selection of breeding animals for litter size, viability, growth rate, efficiency of gain, and carcass desirability, encouraging results have been obtained. Through research, Tennessee animal scientists have been able to reduce average backfat thickness by some 20 to 26% over a five year period. Along with this reduction in backfat thickness, the number of U. S. Number 1 swine was increased over 50%. The results of this work have confirmed the research of others, which indicates that backfat thickness has a relatively high heritability.

At Iowa State, one of America's oldest swine evaluation stations, hogs have been fed on a standard ration for six years. Meat yield records show the average carcass today is yielding 15.5% more trimmed, lean wholesale cuts than six years ago. What does this almost incredible figure mean? It means that if you were a pork processor buying the best hogs available, that in 1962 you would have gotten 5½ tons more trimmed lean wholesale meat from each 1000 head of hogs than you got in 1956.

The experimental data obtained at Iowa State reveal the purebred animals on the test were yielding 26.7% more lean meat in their loin eye (pork chop) than six years ago. There was also a 13.4% decrease of backfat and a 12 pound reduction of feed required to make 100 pounds of gain.

The Western Illinois Test Station found a 12.6% increase in lean wholesale cuts and a corresponding 20% decrease in backfat thickness over a four year period.

At the Ohio Swine Evaluation Station, backfat has been reduced 14.6% since 1954. Loin eye size has increased 6.6% and lean cut yield by 6%.

Data from certification tests on swine secured from purebred swine breeders in South Carolina and fed under uniform conditions at the Clemson College Experiment Station indicated that the animals meeting the certification standards gain significantly faster, on slightly less feed per pound of gain, and produce a leaner carcass. The animals in this test meeting the certification standards possessed significantly less backfat, more loin eye, and yielded a higher percent of the four lean cuts.

This progress on producing a meatier animal for the consumer has been stimulated and made possible through the swine industry's meat type certification programs, on the farm testing, and modernization of market swine shows.

The swine experiment stations have played a major role in the improvement of today's meat-type hog due to the fact that it is the stations' recording and interpreting of research that the producers have used to improve their herds.

Through continuing research and evaluation by animal scientists, the swine producer will be more able to meet today's consumer's demand for lean, high quality pork and thereby obtain a greater return for his effort to improve his swine enterprise.
The Tool Shed
By Jere Brittain

Editor's Note: Jere, a 1961 graduate in Horticulture, served as editor of THE AGRARIAN in 1960-61. The reactivation of the magazine during '60-'61 after two years of non-publication was due largely to Jere's efforts.

What's this thing, Dad?
It's called a grab-skip, Son.
Hey! It has an awfully short handle to be so heavy. Do you know what it's for?
Why, yes. It's for drivin' a grab or knocking it out.
A grab??
Right. There's a set hangin' on that peg. They're for pullin' logs.
Is this funny U shaped thing part of the grabs, Dad?
No, that's a clevis!
Oh, the clevis connects the grabs to the singletree.
Dad, are you making these names up?
Nope . . . the singletree hooks the horse to the load, you see.
O. K. So how do you hook that sin . . . gle . . . tree to the horse?
With these. They're trace chains.
You tie the trace chains to the horse?
No. The trace chains are tied to the hames. They fit against the horse's shoulders. You'd carry the grab-skip in this ring here also.
Hames are mighty hard. Don't they hurt?
Not much. This collar and pad go under the hames.
Oh.

Dad.
Hmm?
You must be kinda old.

Forestry Club News
By Danny Lamb

The Forestry Club is presently preparing for the local conclave held each year prior to the regional conclave. The local conclave features open competition among all forestry club members in a variety of technical and physical events. The winners of these contests will represent our club at Oklahoma State University in May. The regional conclave has a gathering of the top forestry schools in the South, and the competition is keen and fast. Many of our students have already begun practice in hopes of bringing victory to the Clemson Forestry School.

In order to raise money for this trip the club has been busily engaged in a variety of activities this year. On weekends members of the club cut and sold firewood to various people in town. During Christmas we also sold Christmas trees and holly as a further means of increasing our budget.

During homecoming weekend this year the club won first place with its "firetower" display. This was the third first place the club has won in as many years. On dance weekends the club also has "drop-in parties" for all members and their dates.

Each semester the club has a cookout at Lake Issaqueena and new members are initiated into the club. This semester the initiation and conclave were held at the old bath area on the lake.

The club meets every second and fourth Tuesday night in the clubroom beside Riggs Hall. We usually have a speaker or show films dealing with some phase of the forestry profession. Refreshments are served after each meeting and members usually linger around the clubroom and join in bull sessions about professors, tests, or sometimes, even forestry.

All
Your
Cost-of-Living
Items are
Up...

BUT ONE!

In the past 20 years alone, most cost-of-living items have just about doubled in price . . .
Except for electricity, which has actually come down!
Fact! — Since 1943, the average cost of a kilowatt hour to Duke Power residential customers has dropped more than one-third. In that same period, the use of electricity has increased over 4 times, while the standard of living has gone up correspondingly.
It's truer today than ever before . . .
you live better, for less, electrically.

Duke Power
Student life at Clemson consists of more than attending classes and studying. Here, Dona Hallum, Liberty, South Carolina, a sophomore majoring in Food Technology, and Bob Upson, Savannah, Georgia, a junior in Ornamental Horticulture, are shown enjoying the facilities of Hartwell Lake.

Dona serves as Second Lieutenant in the Angel Flight. Besides having their own drill team, members serve as hostesses for Air Force affairs.

The Swimming Team is only one of the collegiate and intramural sports at Clemson. Bob has lettered in swimming and is a member of the Block C Club.

Dona has found that living in the new girls' dorm is more convenient than commuting from home. It also enables her to spend more time fulfilling her duties as President of Omicron Sorority.

In his new position as promotion chairman of the Baptist Student Union, Bob is responsible for seeing that all students are well-informed on B.S.U. activities.

Dona and Bob pause during a study period in the library to discuss the life they share as Clemson students.
Have You Considered A Career With The Clemson College Extension Service?

By George B. Nutt, Director
The Clemson College Extension Service

A career in The Clemson College Extension Service is a possibility for majors in the various agricultural disciplines of Clemson College. Most of the male employees of the Service, a division of the School of Agriculture, are graduates of Clemson. Other state Extension Services, particularly our neighbors North Carolina and Georgia, have many Clemson graduates on their staffs.

Before we get into some of the details of the work, a brief explanation about the Service, including its origin, history and purpose, is in order.

Extension education was born of necessity due to the ravaging effects of the boll weevil which migrated out of Mexico into Texas during the early days of this century. Dr. Seaman A. Knapp, a native of New York, a graduate of Cornell and a pioneer educator, was called upon by the Federal Government to assist the people in the boll weevil infested areas. Demonstrators were employed to work with farmers in developing substitutes for their money crop—cotton. The system worked with various degrees of success and spread to other states suffering from economic agricultural problems.

A few demonstrators, or county agents as they were later designated, served this state as early as 1907. They were for the most part federal employees or employees paid from foundations.

A farsighted South Carolinian, Congressman Asbury Francis Lever from Lexington, became sold on Extension education and coauthored legislation creating The Cooperative Extension Service which was signed into law in 1914. This is known as the Smith-Lever Law. Thus we are celebrating this year the Golden Anniversary of The Cooperative Extension Service.

It is called “Cooperative” because it is financed from Federal, State and County funds and because local people have a strong voice in the program. In all of the states the program is administered by a designated Land-Grant institution which has the privilege of determining the official name. Clemson’s Board of Trustees gave the name “The Clemson College Extension Service” to our program and made it an official division of the school of agriculture.

Most of the finances for this state are derived from funds appropriated by Congress and the state legislature. Counties contribute a significant share and also provide offices for all of the county personnel.

The Cooperative Extension Service is known as the educational arm of the Land-Grant institutions and the U. S. Department of Agriculture. As such, its role is to inform people on the latest findings from the agricultural experiment stations, industry and other sources which will assist them in the solution of their agricultural and home problems.

Congressman Lever stated in support of the Smith-Lever Act, “The agent will become the instrumentality through which the colleges, states, and the Department of Agriculture will speak to all those for whom they were organized to serve with respect to lines of work engaged in by them.” He added that “We have accumulated in the agricultural colleges and the Department of Agriculture sufficient agricultural information which, if made available to the farmers of this country and used by them, would make a complete revolution in the social, economic, and financial condition of our rural population.”

The Congressman was a prophet. There was a revolution, and Extension played a significant role in it. The revolution continues as it must to keep abreast of the times.

A brief reference was made to the home demonstration or home economics phase of our program. Clemson students of agriculture may not have a lot of interest in this phase of our work because there is no undergraduate degree curriculum in this field. Home economics is of tremendous importance to Extension’s overall program and much of our work involves the team

(Continued on page 7)
Chemistry and botany were once viewed as separate and distinct sciences, unrelated in their principles and applications. However, it is rapidly becoming evident that these two sciences have a direct interrelationship, especially in the areas of experimentation into the minute physiological processes occurring in all plants. By combining the sciences of chemistry and botany into an applied program of scientific research, many of the phenomena occurring in plants can be explained. The results of this experimentation can often be applied practically, the result being improved production practices or varieties of crops for modern agriculture.

A good example of this type of operation is a study into the physiological processes of white clover (Trifolium repens L.) being conducted by Dr. Ernest G. Beinhart, Jr., USDA research plant physiologist, working with Dr. James E. Halpin, plant pathologist, of the Botany Department, and Dr. Pryce B. Gibson, USDA geneticist. The project is directed toward the production of a more persistent variety of white clover adapted for forage use in the southeastern United States.

At present white clover is a good forage crop, but its lack of persistence makes necessary replanting, usually about every two years. It has been determined that the lack of persistence is correlated with a decrease in over-all rate of branching. Observance of Figure One will show that stolon eight has produced numerous branches, while stolon nine has produced a negligible number of branches. The answer to the question of persistence in white clover seems to lie in the causes of its branching.

Through careful field and laboratory experimentation and observation, it has been concluded that branching of white clover is definitely correlated with light intensity and temperature, decreased branching occurring under the influence of high temperature and low light intensity. It is believed that temperature and light affect a growth regulator system present in the plant. This system may consist of a stimulator, an inhibitor, or a combination of the two. The temperature and light may operate in such a way as to affect the synthesis of the components of this regulatory system or their utilization in the meristems of white clover.

Several methods of experimentation and analysis have been employed in the study of branching in white clover. First was the observation of gross plant responses, in which the absence of budding was first correlated with persistence. Later, techniques of histology were employed to prove that the problem was not one of insufficient energy (sugar) availability. Now, the chemical basis for the gross plant responses must be determined. As stated before, the presence of a growth regulator system or trigger mechanism affecting branching seems highly probable, but the exact nature of this system and the precise means by which it is affected by light and temperature have not been determined. Once the answers to these questions have been obtained, they can be applied to produce more persistent varieties of white clover.

Thus basic chemical research should lead to a logical answer to an applied botanical problem.

Have You
(Continued from page 6)
approach to farm problems with men and women working together.

The well-known youth program, 4-H, is a most important phase of Extension work. A high percentage of agricultural students have been members of this youth activity which provides valuable training in agriculture, home economics and related subjects.

What Is Required To be an Employee of The Clemson College Extension Service
Since this is being written for The Agrarian, positions within the Service for men will be discussed as follows:
1. Employees must be graduates of Land-Grant colleges or universities, preferably with farm backgrounds.
2. They must qualify for admission to the graduate school. This is a requirement imposed in recent year because of the importance of graduate training to the program.
3. They should be genuinely interested in people and be willing to work long hours as demanded of farmers, homemakers and 4-H members.
4. Employees must be willing to travel. County workers remain in the confines of their respective counties except for authorized district and state meetings.

Experience has indicated that graduates from any of the agricultural disciplines can be expected to develop into good agents. This includes forestry, agricultural engineering, dairy science, animal science, poultry science, horticulture, agronomy, agricultural economics, vocational agriculture, entomology and botany. Reference here is to the county worker who joins the Service as (Continued on page 15)
Chemical Energy Weed Control

By William P. Brown, Agronomy, '64

Weed control is one of the oldest agricultural practices known to man. At the same time it is one of the newest fields to receive detailed, scientific attention.

The practice of weed control is essential for the production of all crops. Weeds compete with crops for water, light, mineral nutrients, and space. Weeds increase the cost of labor and equipment, reduce the quantity and quality of crops, and harbor insects and diseases.

Man has accepted the weed challenge and waged war with its forces by many means including his own tedious labor. Man first started out with the hoe, then shifted the burden to livestock. After many technological advances, mechanical devices ranging from the sickle to the diesel tractor, complete with tillage implements of all kinds, were used; but the hoe was always present.

According to U.S.D.A. publications, much of the energy and horsepower used on farms is for the purpose of moving more than an estimated 250 billion tons of soil each year. This represents the world's largest materials-handling operation, and the energy required to perform this work is enormous. At least one-half of this vast tillage and cultivation operation is practiced solely for the control of weeds. Energy is defined as the capacity to perform work. In this context, herbicides are real work horses. In effect, herbicides represent additional production tools or sources of energy for increasing farming efficiency by reducing horsepower and energy requirements.

The cotton crop has traditionally been one requiring a tremendous amount of hand labor. What labor was required to control weeds in the row during the growing season, and at maturity additional labor was required to harvest the crop. The use of mechanical cotton pickers was not fully practical as long as the hand pickers replaced were also the labor force necessary for the hoe work. It was not feasible to employ labor for this small portion of the season. The advent of improved methods of weed control by chemicals virtually eliminated the need for hoe-hands. This allowed mechanization of cotton production to proceed. In a recent publication by U.S.D.A., cost studies in cotton show that to control weeds in this crop by hoeing and cultivation requires 25 to 30 man-hours per acre per year at an annual cost of $15 to $20. The use of herbicides for weed control in cotton reduces the man-hours per acre from 8 to 12 and lowers the cost of weed control from $8 to $12 per acre. If we apply these per acre savings to the entire cotton crop, farmers will save more than $75 million each year. This is only one example of the work-performing capacity of herbicides and points to the vast potential value of chemicals in improving farming efficiency.

Weeds are also a problem in other than agricultural situations, and their control is of concern to virtually everyone no matter what his occupation. Control of undesirable vegetation is of major importance in the maintenance of highways, railroads, industrial plant grounds, commercial waterways, lakes, irrigation systems, golf courses, lawns, and many other situations touching nearly every aspect of man's activity. Weeds such as poison ivy and ragweed, which cause hay fever and other allergies, contribute markedly to human misery, and their control is of great concern to many people.

Progress in chemical weed control during the past 10 years has been fantastic. This progress has been due to research supported by public and private funds and to public interest in many cases. Within this brief period many new chemicals and weed control techniques have been developed. The development of the selectivity of herbicides, the introduction of the pre-emergence weed control, the development of pre-planting chemical methods of control, and the role plants play in changing the structure, activity, and selectivity of herbicides are only a few of the principal results of this research.

The use of herbicides, in some instances, is beginning to exceed the fundamental and applied research information available to insure their safe use. If a better balance between research in weed control and the use of chemicals is not obtained and maintained in the immediate future, the risk of damage to crops and all phases of the total environment will increase.

The adaptability of chemical energy for controlling weeds offers almost unlimited possibilities for improving the efficiency of weed control. Our future rate of progress will be largely deter-

(Continued on page 21)
Pelleted Coastal Bermuda—New Feed For Southeast

By Eugenio E. Sanchez-A.,
Agricultural Engineering, '65

At a time when livestock producers, primarily in the Southeast, are striving to reduce the costs of importing livestock feeds from other parts of the country and at the same time increase their production, the pelleting of Coastal Bermuda grass has provided a new technique which could possibly be the best solution.

Coastal Bermuda grass is rapidly becoming the most important forage crop in the Southeastern states to the extent that more than 2,000,000 acres are annually grown in this part of the country. Compared with alfalfa—the most widely used crop in pelleting or wafering—pelleted Coastal Bermuda grass has proved to have about the same nutritional value. Furthermore, the crop can yield up to 10 tons per acre if proper fertilization and management practices are employed.

Pellets are small, cylindrical feed products made of finely chopped and ground material which are first dehydrated and then compressed into dense units ranging in size from 1/4 to 1/2 inch diameters. The compactness of the pellets has increased the efficiency of transportation, reduced waste in feeding, increased feed consumption, and improved the handling and storage facilities. Furthermore, the pelleting or wafering operations as compared with baling have made possible the complete mechanization of hay handling from windrow to feed bunk. Compared to baling, where much of the nutritional value of the crop is lost through the sun curing process, pelleting retains a higher percentage of the feed value (particularly carotene, which is the source of Vitamin A) through the dehydrating process which only results in the loss of water. Pelleting also permits the addition of concentrates which further increases the nutritional value of the feed and allows for the balancing of diets. On the other hand, pelleting has not gained acceptance when used as feed for dairy cattle because it apparently causes a slight depression in the butter-fat content of the milk. The reason for this has not yet been determined. It is assumed that the fineness of the pelleting material might be the cause. In this case, wafered alfalfa hay which contains sufficient roughage is preferred.

A typical processing plant consists of a dehydrator, a hammermill, and a pellette. As with all new developments, the initial cost of a pelleting processing plant is high; and the ex-

(Continued on page 20)

4-H Club News

By Barry Wood

The Clemson College 4-H Club, organized on campus a few years ago, serves many needs. Clemson College students who had been active in 4-H Club work in their home counties wanted to cut ties with an organization which had helped them to achieve a better adolescent life, but rather continue to play a role in the 4-H Club. Most of the Club's activities are on a local level; however, we do maintain contact and exchange ideas through members who attend regional or interstate conferences.

Our Club consists mainly of South Carolinians, but we also strive to include in our membership former 4-H'ers from other states who are presently attending Clemson.

The Clemson 4-H Club is active not only during regular school session, but also during the summer months. The club plays host to the young people who attend Farm and Home Week at Clemson every summer. Programs, socials, and other entertainment or recreation are presented by the coordinated effort of the extension service and the 4-H Club.

The Clemson 4-H Club prepares its monthly meetings so that many individual interests of the members may be satisfied. We have films, local speakers, 4-H delegates to foreign countries, and also programs prepared by the members themselves. As our membership increases and our financial status improves with each passing year, the Clemson 4-H Club strives for more coordination among agricultural clubs, and for a greater variation of goals and projects.
JAMES RALPH BALLINGTON, JR.

Jim Ballington, a major in Agricultural Education, is from Lexington, South Carolina. He is a graduate of Gilbert High School, where he was a member of the Beta Club. He is very active in the Future Farmers of America, having held chapter, federation, and state offices while in high school, and serving as chapter president at Clemson College. In addition he was chosen State Farmer in 1960.

Jim has served as managing editor of The Agrarian, is a member of Alpha Tau Alpha, Alpha Zeta, and the Student Agricultural Council of Club Presidents, of which he is reporter.

JOSEPH WILLIAM BARNETT

Joe, a native of Clover, South Carolina, is majoring in the Production Technology Option of Dairy Science. Joe’s activities include chancellor of Alpha Zeta, secretary-treasurer of the American Dairy Science Club, second vice-president of the Regional American Dairy Science Association Student Section, and member of the college senate. He has received the following scholarships: Sears Roebuck, Ralston Purina, and South Carolina Dairy Association.

Joe was a South Carolina delegate to the National 4-H Conference in Washington, D.C. in 1960. At Clemson he is a member of Blue Key, Tiger Brotherhood, Advanced ROTC, and is listed in Who’s Who Among Students in American Universities and Colleges. In addition he was on the freshman baseball team, and Dairy Cattle Judging team.

JIMMY MAXWELL CARTER

Jimmy Carter, born in Colleton County, South Carolina, is a senior in Agronomy. In high school Jimmy was Vice President and President of the Student Council, and also President of the Junior Class.

At Clemson he is an advanced military student, a member of Phi Eta Sigma, Alpha Zeta, Phi Kappa Phi, Gamma Sigma Delta, Blue Key, Kappa Delta Chi social fraternity, Kappa Alpha Sigma, and is listed in Who’s Who Among Students in American Universities and Colleges.

Jimmy has been awarded the Alpha Zeta sophomore award and the Gamma Sigma Delta sophomore award for his outstanding work at Clemson.

This fall Jimmy plans to enter graduate school at the University of Illinois, concentrating on Plant Physiology and Biochemistry.

JOHN D. JOYE

Jake Joye is a senior in Agronomy. He has been an energetic student and leader in many activities, willingness to take over committees and do "behind-the-scene" work is notable. His accomplishments are noteworthy in academic and extracurricular activities.

His point ratio of 3.41 is evidence of his ability. He is a member of Phi Kappa Zeta, Gamma Sigma Delta, and Tau Alpha.; has been a key figure in many "behind-the-scenes" activities of the ASAE Student Branch. Jake is married, South Carolina.

FRANCIS TILLMAN MATHIAS

Francis Tillman Mathias is from S. C., and is a graduate of Lexington A. where he was student body president. He was a member of the Beta Club. Tillman is majoring in Animal Husbandry and is a member of the Alpha Zeta, College of Agribusiness, and P.O.T. Tillman has a cumulative average of 2.67, and was held by the Sears-Roebuck Freshman Agricultural scholarship, and is very active in the Block And Bridge, as well as vice-president for 1963-64.
**MARION LeRON ROBBINS**

Marion LeRon (Ronnie) Robbins is a Horticulture major from Chesnee, South Carolina. For his campus, regional and national activities Ronnie holds many honors including: cumulative scholastic record of 2.79; treasurer and president of the Horticulture Club; stewardship chairman of the Baptist Student Union; circulation manager and editor-in-chief of The Agrarian; president of the Association of Collegiate Branches, American Society for Horticultural Science; president of the Collegiate Branch, American Society for Horticultural Science, Southern Section; winner of the Joseph B. Edmond Southern Region and L. M. Ware National student horticultural research paper awards. In addition, Ronnie is a member of Alpha Zeta, Blue Key, Student Agricultural Council, Council of Club Presidents, and is listed in Who's Who Among Students in American Universities and Colleges.

**JON MARTIN ROGERS**

Jon Rogers of Piedmont, South Carolina is a senior in Dairy Science and is specializing in Business. He is a member of the American Dairy Science Club at Clemson, Blue Key, Tiger Brotherhood, and Alpha Zeta. Jon has won many honors including the following scholarships and awards: Sears Roebuck, Coburg, Southern Ice Cream Manufacturers, Ambrosia Chocolate, and Virginia Dare. He is a Distinguished Military Student and has served as vice-president of the American Dairy Science Club at Clemson, President of Southern Region American Dairy Science Association Student Section, a member of the Dairy Products Judging Team, and is listed in Who's Who Among Students in American Universities and Colleges.

**LUTHER WATERS, JR.**

Luther is an Agricultural Education major from Batesburg, South Carolina. He is a graduate of Batesburg-Leesville High School where he was active in the local chapter of Future Farmers of America. In 1959 he was awarded the State Farmer degree by the South Carolina Future Farmers of America Association.

Since enrolling at Clemson Luther has been active as president of Alpha Tau Alpha; president of the Lutheran Student Association; vice-president of South Carolina, Georgia, Alabama Lutheran Student Association; secretary-treasurer of the Council of Agriculture Club Presidents; treasurer, vice-president and sentinel for the Collegiate Chapter of Future Farmers of America; and a member of Alpha Zeta. He is also a member of the Advanced Corps of the Clemson College Army ROTC.
Processing and its Overall Effect on Agriculture

By Lem Dillard, Agricultural Economics, '65

Processing is, in effect, manufacturing, and may be described as those operations in food and agriculture concerned with changing the forms of agricultural products. Processing has an important place in the farm marketing system. Processing is important in the preparation of food for human consumption, as we cannot consume most farm products in the form in which they come from the farm. This is clearly shown in the case of livestock products. The perishability of most farm food products gives rise to much of the processing of foods and this characteristic makes processing an indispensable part of those activities to be found in the moving of products from farms to the city.

A spectacular expansion has occurred in the processing of food products in recent years. Many new forms of food products are now available to the consumer such as have never before been seen in American food stores. The many new forms of processed foods include table-ready meats, canned citrus juices, frozen concentrated juices, prepared cake mixes, baby foods, pre-cooked frozen and canned vegetables and meats, instant powdered potatoes, and the frozen TV dinners.

Processing is not just an additional service to consumers as it has been in the past—it is now a highly competitive business and has had marked overall effects on all phases of agriculture. The recent trend in processing of foods has had marked effects on the prices of agricultural food products. These have been varied effects on the entire agricultural industry from the farmer-producer to the consumer.

In many cases the increased use of processed foods means the farmer can sell products he could not sell otherwise. Through the processing of foods, the farmer can dispose of lower quality fruits and vegetables that are not up to fresh standards. Processing may also help to increase the demand for farm products, yielding possible higher returns to the farmer per unit of the raw product. However, not all of the effects on agriculture have been favorable. The shift from fresh markets for food might have weakened the bargaining power of the farmer. The trend in processing tends to favor the farmer cooperatives and the larger farms as the markets for those processed foods demand large, uniform supplies of these processed foods. The small farmer is almost completely eliminated from these markets unless he markets his products through a cooperative or a marketing association of some type. This problem, however, is not altogether a new one created by the present trend in processing, as it has existed previously when chain stores began to rely more and more on the larger producer for their farm products.

This processed foods trend has also meant great fortune to some and misfortune to others, as out of it has arisen many areas of specialization in production. These areas have been specialized so much that the cost of production has been reduced enough to drive many of the smaller competitors out of business. These specialized areas also must have enough resources available to operate their processing plants. In many of the more remote areas, it is impossible for the farmer-producers to stay in their old business because of the lack of these resources. Many new problems concerning the choice of a new occupation or product have arisen for these farmers.

We begin to see how greatly these trends have affected costs and returns to the farmer when we take a look at four products which were chosen by researchers in their investigations of processing's effects on agriculture—lemons, snap beans, Florida oranges, and potatoes. The data was collected for the years 1959 and 1960.

Snap beans are a prime example of how processing can result in a shift in production areas. Oregon, New York, Wisconsin, and California produced 39 per cent of the processed crop in 1940-1949; but by 1960, their share was up to 55 per cent of the total. Growers returns for snap beans marketed fresh amounted to $2.42 per bushel; snap beans for freezing—$1.69 per bushel; and

(Continued on page 13)

Alpha Zeta News

By Joe Barnette

Alpha Zeta took in 11 members during second semester. They went through informal initiation on April 1 and formal initiation on the evening of April 6. The annual Spring Banquet was held on April 13, with all faculty members of AZ and their wives, plus the old and new members invited to attend.

AZ members have spoken to over 500 high school students through "Operation Contact." It is felt that this is one of the most worthwhile and important projects we could undertake since the majority of high school students are totally unaware of the vast career opportunities agriculture has to offer.

Plans are to distribute the teacher evaluation sheets again this semester prior to exams. Many favorable comments have been heard from both faculty and students concerning this project, and there is some expectation that the project will also be tried by groups from other schools on campus.

The South Carolina Chapter of Alpha Zeta attended the Southeastern Conclave at Gainesville, Florida, home of the University of Florida, on March 20 and 21. Chapters were present from Auburn, Florida, Georgia, Tennessee, North Carolina State, VP, and Clemson. Clemson won the outstanding chapter award again this year. The award has been given only twice and the Clemson Chapter is proud to have received it both times.

At the request of all those chapters represented at the meeting in Florida, Clemson will be host to the 1965 conclave.
Changing Curriculum Of Vocational Agriculture

By Don Dempsey, Agricultural Education, '64

With the rapid change in agriculture in recent years comes a need for changing the curriculum in vocational agriculture on the high school level. Much of the emphasis, formerly placed on the students' supervised farming programs, is being shifted to agricultural sciences, importance of agriculture, management and farm mechanics. This is particularly true for the first-year or ninth grade students.

The new curriculum, broader in scope, contains more general agriculture and will appeal to a greater number of students. Farming programs will continue to be encouraged for students whose home farm situations provide the needed farm experiences.

Two additional features of the new curriculum are (1) placement of students on a good farm for learning experiences and (2) work experiences in agricultural occupations. This will benefit many vocational agriculture students who cannot carry out creditable farming programs on their home farms.

This is not to say that there is no place in vocational agriculture for the supervised farming program. It has long been recognized that learning to farm by "doing" is most desirable. However, with fewer people farming, the number of students who can have creditable farming programs becomes smaller each year. While the number of farmers decreases, the number of people needed to provide the necessary services in agriculture is on the increase. This new program will provide opportunities of learning about, and getting some experience in the many agricultural occupations.

Agriculture teachers think the new curriculum has many advantages. It should result in a broader knowledge of agriculture. Students will be familiar with non-farm agricultural occupations. Many students, who would not otherwise be eligible, can enroll in agriculture. A greater appreciation of the entire field of agriculture can be developed.

Many of our agriculture teachers in vocational agriculture are reflecting this idea in re-planning their courses of study. Vocational agriculture today is being geared to meet the changing need in agriculture.

Processing And Its Overall Effect On Agriculture

(Continued from page 12)

snap beans for canning—$1.44 per bushel. However, yields averaged as much as 30 per cent more per acre in snap beans which were grown for processing. These higher yields were generally the result of more suitable production areas.

For lemons, the trend in processing has provided a great outlet for the expanded production of the last few years. In the 1950's, production almost doubled while the farm value of lemons dropped approximately one third. The amount of fresh lemons on the market is limited and the remainder of the crop must be disposed of through processing. Growers' returns ranged from $1.45 per carton of fresh lemons down to about 54 cents for the same amount of lemons used in processing. However, on the other end of the marketing chain of operations, retail prices were $7.00 for a carton of fresh lemons, $6.00 for an equivalent quantity of frozen lemonade concentrate, and $4.00 for single strength lemon juice. A good portion of the difference was in the cost of transportation of the lemon products. The cost of transportation ranged from 15 cents per carton of lemon juice to 91 cents for fresh lemons. Concentrate lemon products cost an average of 68 cents for transportation.

Florida oranges are a good example of processing paying off all the way down the line—to farmer, to marketer and to the final consumer. Concentrated orange juice prices were only a fraction of a cent less than the prices of juice made from fresh oranges during the 1959-1960 period. These processed orange juice products brought higher returns to the grower than did the fresh orange products. Florida growers got about 8.8 cents for oranges equal to 24 ounces of processed juice, and got about 6.8 cents for equal quantities of fresh oranges. The main reason for the success of orange processing is the lower transportation cost for the processed orange products. Also, the lower retail margins have made the orange processing business more successful.

Processing has increased the total consumption of potatoes. In 1956 only 15 per cent of the potatoes were processed, whereas over 25 per cent of the potato crop is processed today. This increase has meant an increased use of potato products. Processing potatoes caused a decline in the demand for fresh potatoes, but the increased use of processed potatoes has more than made up for the decline it created. Up until the time that processing of potatoes came into being decreased per capita consumption of potatoes was thought to be due to the increased per capita income of Americans which had altered their eating habits. This long term drop off has disappeared and has even risen slightly over the past few years due to this increased trend in processing.

This trend toward processed foods is more apt to increase than to decrease in the future, due to competition within the food industry. In general, a new form of processed food has the advantage on the grocery shelf only as long as it is new. When the shopper finds an even newer product, chances are she will buy it. This element of convenience to the consumer, which is a built-in property of processed foods, has tremendously increased the purchasing of these new processed foods. Thus, this encouraging jingle of the cash register should impel businessmen to strive to invent even newer and better methods of processing foods in the future.

The data used in this article was taken from "Food Processing: Impact on Prices" in the December 1962 edition of The Farm Index.
In the poultry industry of the past each individual farm had enough poultry for its own use. Today poultry has become a very large and highly specialized industry. In past days, chickens didn't have a highly nutritious diet as they do today. Corn was their main diet and was fed cracked, shelled, or on the cob. Table scraps, liquid skim milk, and wheat or oats were also fed to chickens because they were cheap and available. The nutritional value of these feed-stuffs was not known at that time. As the industry advanced, other animal proteins were fed to chickens. During World War II soybean meal became important as a protein source, and more recently added fat has become an important supplier of energy.

Feed conversion has made rapid improvement along with the increased rate of growth of the birds. In 1927 it took about 10 weeks to get a 1½ pound broiler; whereas today, it takes only about 8 weeks to grow a 3½ pound bird.

Formerly the practice was to let the chickens out on the ground for the daylight hours and put them in the hen house for the night, but today chickens are raised entirely in a house and are never let out.

The incubation of chickens has also advanced with the time. All chicks used to be hatched by putting eggs under hens, but today we have modern incubators that can hatch more chicks from the same number of eggs. These incubators are all automatic and are far more efficient than the hatching procedures once used.

Many chicken houses of today are automated. On the most modern egg farms, the eggs are never touched by human hands until the housewife takes them out of the carton. We also have high-density environmentally controlled houses where the temperature can be kept constant all year round for better growth, livability, and egg production. Today it is not uncommon for one man to take care of about 40,000-50,000 broilers or 10,000-15,000 hens if he has highly automated equipment. The poultry industry of today is a highly mechanized and specialized industry, and the man who is not willing to stay modern and keep up with the times had better make plans for another business.

Pre Veterinary Club News

By Pete McCoy

The Pre-Veterinary Club has planned an active schedule for the Spring semester. This is the semester that Sophomores, Juniors, and Seniors who have met the requirements to enter the Veterinary School at the University of Georgia are selected to enter the University of Georgia in September of 1964. Ten students will be selected from South Carolina this year. This selection is based on scholastic achievement, personal interview, and scores on an achievement test which was given during February.

The club has planned to visit the open house at the Veterinary School in Georgia during April. This will give each prospective student a chance to see the Veterinary School.

A banquet has also been planned for this semester. The banquet will be in May during which the club officers for the following year will take office and take over the activities of the club for the rest of the semester. This banquet is the highlight of the club year.
SUCCESS AND SERVICE

A PROFILE OF DR. J. W. JONES
By Kenneth K. McDaniel, Feature Staff

The Agrarian proudly introduces the first in a series of articles recognizing outstanding leadership and teaching personnel in the School of Agriculture at Clemson University. This season’s profile is of Dr. J. W. Jones, Director of Agricultural Teaching, and Professor of Agronomy.

Dr. Jones was born on a farm in Greenville county and was graduated from Mauldin High School in 1931. He entered Clemson in 1933 and graduated with a Bachelor of Science Degree in Agronomy in 1937. Having received the award given to the senior with the highest cumulative scholastic record and the Anderson Fellowship for graduate studies, he entered Cornell University Graduate School. In 1938 he received his Master of Science Degree, and later re-entered and completed requirements for a Ph.D. degree in Genetics and Plant Breeding.

Dr. Jones took a brief pause in his stimulating career to serve as an infantry officer in the U. S. Army from 1942 until 1946.

Other than his military service, all of Dr. Jones’ employment has been with Clemson. After serving as Assistant County Agent for a year in 1938, Dr. Jones entered Clemson again as an Instructor in Agronomy. He has now his full professorship and, because of administrative ability, he has been appointed Director of Agricultural Teaching. Because of these administrative responsibilities his teaching is limited to Agriculture 101, an introductory course for freshmen. Despite his limited teaching, Dr. Jones’ heart is still behind the lectern in a filled classroom.

Dr. Jones is a member of Alpha Zeta, Phi Kappa Phi, Sigma Xi, and Gamma Sigma Delta fraternities. He is also a member of the Anderson Rotary Club and Clemson Baptist Church, in which he is currently serving as Deacon. Dr. Jones is also an active member in the local division of the United States Power Squadron. His hobbies, other than boating, include hunting, fishing, and gardening.

In recognition of his outstanding contribution to the instruction of students at Clemson University and to the field of agriculture, The Agrarian proudly presents this story of the Success and Service of Dr. Jess Willard Jones, Professor of Agronomy, and Director of Agricultural Teaching.

Have You

(Continued from page 7)

assistant county agent.

In the large counties where two or more assistants are employed, the agent may retain his scientific identity by concentrating his efforts. In other situations generalization is unavoidable. Graduate work provides the opportunity to specialize, and there are openings from time to time at the state level for specialists in all of the disciplines. These positions are coordinated with the subject matter departments and most specialists are headquartered at Clemson.

Subject matter or commodity agents are being employed to assist county agents in two or more counties. For example, we have an area agent—horticulture—to serve Charleston, Colleton, Beaufort and Jasper Counties.

It is inappropriate to spell out working conditions, salaries, etc., in this article. But let me say in closing that we are always interested in able men who wish to make Extension work a career. It is also a wonderful place to gain valuable experience for a career in research, resident instruction, industry or farming. We hate to lose good men, but anticipate that some employees will seek greener pastures.

The ultimate in county work is to become county agent. He is the leader of the total program. The position associate county agent has been established in most of the counties for the promotion of assistants who have met certain requirements.

We have a fine staff of able, dedicated employees. If you wish to know more about the Service and possibilities of employment, I suggest that you talk with your department head, extension specialists, our district agents or stop by my office for a visit.

FIFTEEN
The development of the dairy industry has evolved from milk being secured from the "family cow" into a complex system of milk being delivered in an attractive sanitary package. The first packages for milk were large wooden buckets delivered to the door of the consumer.

The use of glass bottles was probably the first major improvement in packaging milk. The bottle with the "lightening tops" was the most common type when milk bottles first came into use. The closure had a flat tin disk with a paper gasket held against the mouth of the bottle with a wire bail actuated by a wire lever arrangement. The wire was permanently attached to the bottle.

In 1889 the first so called "common sense" bottle was manufactured and this is the most commonly used glass container of today. A stiff paraffined fiber disk seated into the recessed area of the mouth of the bottle serves as a closure. More recent ones use laminated aluminum foil caps to cover the pouring lip of the bottle.

The first use of glass bottles had some opposition by consumers, apparently because they associated this method with dispensing medicine. It took a period of years before bottles came into general use. Even during the early 1900's milk was distributed in bulk and measured into the consumer's vessel. Between 1910 and 1920 pasteurization and the regulation of milk supplies in the interest of public health became quite general, and more cities made it compulsory to deliver milk in sealed bottles.

Milk in glass bottles makes an attractive package. With the emphasis in early years on the creamline of milk, glass showed this characteristic to good advantage. The consumer began to associate quality of milk with the depth of the cream layer. With the advent of homogenization the creamline of milk began to lose its appeal. This was one factor which made it possible to use packages of less transparency.

The outlet for dairy products as with other food products shifted from the corner grocery store to the retail super-markets. With this new way of merchandizing, self-service and check-out counters, it was difficult to get stores to keep up with returned glass milk bottles. Unless empty bottles are returned, it is too costly to package milk in glass. A new package was sought for handling milk in the super-markets. A paper container was the new package for milk. The paper carton was suited to this new way of merchandizing as no deposits were required, no bottles had to be returned, and the store manager did not have to bother with refunds as it was a one trip disposable container. The package was designed for ease of handling; it made an attractive unit, and dairies could use the side walls for advertising. One disadvantage in the carton was that it had to be wax coated. Occasionally flakes of wax would get into the milk causing complaints. The disadvantages of using waxed paper cartons caused the development of a plastic coated paper container. Because of its better quality almost all paper milk containers are now of the plastic coated type.

There are many different sizes of milk cartons in use by the industry. They range from half-pint to gallons with all the in-between sizes. The half-gallon carton is usually the most popular size for use in the home. Gallon jugs made of glass are being used in some markets. Also bulk containers (three, four, five or six gallon sizes) made of plastic liners within a cardboard box are used for delivery of milk to homes as well as to institutional trade. These types of containers appeal to the economically minded consumer.

A new type design of paper container is the "Tetra-Pak." It is made of plastic coated paper and formed in the shape of a tetrahedron. Its main use at present is for supplying a market that requires a package for individual servings of milk and fluid dairy products. The most recent development in containers for milk is the use of plastic. Plastic gallon jugs are being test-marketed in many areas including markets in South Carolina. If this plastic jug is accepted, then more plastic containers of all sizes will be introduced.

The dairy industry is a dynamic one. The use of different containers is just one of its many facets. The dairy industry is forever seeking ideas and developments and improvements in marketing nature's most nearly perfect food.
Farm Of The Future
By Bill Whitfield, Feature Staff

Let us never forget that the cultivation of the earth is the most important labor of man. "When tillage begins," said Daniel Webster, "other arts follow. The farmers, therefore, are the founders of human civilization."

It has been said that nature is the most thrifty thing in the world; she never wastes anything; she undergoes change, but there's no annihilation, the essence remains matter is eternal.

Agriculture is a part of nature and very much like nature. It must undergo change and there is no annihilation if the civilization of this world is to survive.

It must undergo change. Keeping this in mind let us reach into the future and picture farming of the year 2000 A.D.

If we were flying over a farm in the year 2000 A.D., it might appear much like a huge plastic greenhouse, but the size and the processes that go on inside are far greater than any processes on the modern farm of today.

The field proper of this farm of the future consists of one 50 acre plot. Adjacent to the field is located the farm home constructed of plastic or of some refined synthetic. Both the field and house areas are covered by a clear plastic bubble with a rectangular base. This huge bubble has no supporting structure and is supported solely by air pressure. Air for supporting the covering and production of a controlled climate under the covering is supplied by large ducted fans, located around the base perimeter of the bubble. Climate is controlled by air temperature and humidity conditioning electrical units powered by solar energy cells.

Energy for operation of the farm equipment is supplied by using a very large solar cell connected to a huge underground battery storage plant. By using artificial lighting, the crops' exposure to light could be controlled, thus possibly increasing yields.

All cultivation, harvesting, irrigation, etc., is done automatically with equipment attached to a large movable truss which spans the full width of the field. If a processing plant is needed for the crop, this also can be supported on the truss, and the end product would be ready for the consumers of agricultural products.

This power truss is one of the most unique features of this farm of the future. It replaces the tractor—doing all jobs from breaking the land to harvesting. This power truss is remote-controlled from a central power station.

The farm family that occupies this farm house would have a vacation in itself. The farm home is located under the dome and therefore free of dust, weeds and insects.

Land is a many splendored thing. To some, it is soil—how many bushels of corn will it raise? To others, it is a small piece of the earth's surface, rare as a gem, something to be cherished and enjoyed like an old masterpiece. To still others it is space, something on which to build a home, a shopping center, an apartment.

To the farmer, land is the means of his survival. But agricultural land is dwindling because of the increased acreage which the ever-expanding population requires for other uses. To overcome this factor, the farm of the future will have to produce more on less land. This is going to require more efficient use of the land we have, better labor efficiency, and more economic use of all of the resources of our land.

Agriculture must undergo change to keep up with the changes of the world of today.

Perhaps this farm of the future seems far fetched today, but tomorrow the farm of today will be obsolete. This farm is not just the idea of one person; it has been carefully thought through by agricultural engineers at Texas Technological College at Lubbock, Texas. A model has been erected of this farm.

Our rapid growth of agricultural productivity has strengthened the favorable terms on which we and the world have had access to agricultural

(Continued on page 21)

Block And Bridle Club News
By Jim Heselbarth

This spring the Clemson Block and Bridle Club sponsored a meats judging team, coached by Dr. George C. Skeley, Jr., which took part in a meats judging contest at the University of Tennessee. This contest was open to all boys not having previous judging experience in meats.

On March 21 the Block and Bridle Club held its annual spring barbecue at the annual White-Orange spring football game.

On April 23 through the 25th the club helped sponsor the Southeastern Intercollegiate Judging Contest. Members of the club helped get the sheep, swine, and cattle ready for the evaluation contest on Thursday, April 23 and the judging contest on Friday, April 24. The club and the Animal Science Department were hosts to approximately 17 teams from the Southeast. After the intercollegiate contest the club sponsored a judging contest for 4-H and FFA boys from throughout the state. Approximately 60 teams took part in this event.

The club activities for the year will close with the Block and Bridle Club annual banquet. At this banquet the Merit Trophy will be awarded to the outstanding senior club member. Tom Bell of Orangeburg was named the club's 1964 honorary member. The Block and Bridle Club is concluding another successful year of activities which have included sponsoring trips of the meats and livestock judging teams, two barbecues, and scholarships to two outstanding juniors, George Dorn and Dan Bozard.

SEVENTEEN
The processing industry in South Carolina is very small. Yet the trend in the United States is toward the consumption of more processed fruits and vegetables. Today about one-third of our nation’s 43 million married women work in contrast to about one-fourth 20 years ago. These women are demanding foods which can be prepared quickly and easily to serve to their families. Americans are also dining out at higher rates than ever before. This dining out market amounts to a 28 billion dollar per year business. The restaurants that are serving these meals are demanding and getting processed and prepared foods which are quicker and easier to serve, and on which cost per serving can be quickly and easily determined.

A look at some of the latest statistics reveals that we consume about 92 pounds of fresh fruit, 23 pounds of canned fruits, 13 pounds of canned juices, 3 pounds of dried fruits, and 8 pounds of frozen fruits per person per year.

A closer inspection shows South Carolinians each year consuming 14 million pounds of berries, 4 million pounds of pears, and 1 million pounds of plums in the canned and frozen category.

Only a small proportion of South Carolina’s fruit crop is processed in the state, the main fruit crops being peaches and grapes. Five years ago about 10 million pounds of peaches were processed, while in 1963 it was 25 million pounds. The grape industry is small with only 1800 acres, predominantly bunch grapes, grown in the state. Most of these go to the juice plants.

A look at peaches shows that this fruit continues to be the nation’s most popular canned fruit, increasing its production to three to four times that of 10 years ago. Yet this still remains less than 5% of the nation’s total canned peaches. Part of this lag results from varieties grown, technical problems involved in processing freestone peaches, and certain federal standards.

About ninety per cent of the frozen peaches are sold in 30 pound tins to institutions such as hotels, bakeries, etc. South Carolina is not getting its share of this 60 million pound market.

Other fruits which have potentials for processing in South Carolina are apples, pears and small fruits.

Most of the commercial pear production has been concentrated on the Pacific Coast. The bacterial disease fire blight has been responsible for a scarcity of pear orchards in the Great Lakes states. A commercial baby food processor is sponsoring a research program at Clemson searching for ways to successfully grow pears in South Carolina. The demand for pears for processing is excellent, but at present the state only has 400 acres.

Within the state there are a number of commercial plum plantings, some of which are large enough to supply processors. The potential plum production has not been explored to the fullest. Also certain processors are interested in securing a source of Stanley prunes.

One fundamental reason for the undeveloped state of the canning industry in South Carolina has been the shortage of high-quality raw materials. The explanation of this lies in the fact that South Carolina specializes in the production of fruit for the fresh market. It should be noted at this point that processing is not a solution to poor quality fruit culled from this fresh market.

There are wide differences as to why the processing industry has not developed to a fuller extent in South Carolina. Some obstacles that have to be overcome are poor grower-processor relationships, low quality of the processed product, lack of initiative in marketing, lack of capital, and the fact that canners are operating at less than capacity. South Carolina has the potential for increased processing with climate and soils favorable for fruit production and growers with the technical know-how to grow quality fruits and the desire to increase fruit production to meet processing demands. South Carolina is beginning to meet the challenge for the tremendous potential for processing in the state.

Kappa Alpha Sigma News

By Pat Hunt

The Agronomy Club (KAE) started off its new semester with the election of new officers for 1964. The following were elected: President, Tommy Hart; Vice President, Joe Ben Weeks; Recording Secretary, Pat Hunt; Corresponding Secretary, Ben Morton; Treasurer, Jimmy Hiers; Junior Advisor, Dr. C. E. Bardsley.

Julius Faber, a graduate student from Holland, spoke March 3 on the geographies of Holland, and on the differences of Holland and American universities.

Dr. U. S. Jones, Head of the Agronomy and Soils Department, spoke to the Club on the subject “The Future of Agriculture—Especially the Agronomic Aspects Of It,” on March 17.

Ben Morton is obtaining some slides from KAE on the activities of the different clubs in the nation. These will be shown at one of our meetings this spring.

The Club took a trip to Charleston, South Carolina on the weekend of April 17 and 18. We toured the grain elevator at the Charleston Port and the American Agricultural Chemical Company.

We had a steak supper on April 28 in honor of the senior members of the Club. Professor “Frosty” Bauknight was guest speaker for this occasion.
Freeze-Drying Of Foods

By Ralph S. Lewis, Food Technology, '65

Since the beginning of time, man has been searching for new and better ways to preserve his food. Today, one of the noticeable developments in food preservation is the renewed interest in freeze-drying.

Freeze-drying is not a new method, as it was used twenty years ago for the preservation of biological materials including blood plasma. The reason it has not been used more extensively in the food industry is the high cost involved. With new innovations, however, the cost has been reduced somewhat, thus giving rise to increased application in the food industry.

The freeze-drying method, as the name implies, combines the advantages of preservation by freezing and by drying. The moisture is removed from the food without appreciably changing the shape, color or taste of the product. With the water removed, the food can be stored for long periods of time without refrigeration. The freeze-dried product loses substantially all of its moisture in the process. Reconstitution is accomplished by simply adding water and allowing a short time for the original amount of moisture to be reabsorbed by the food.

The first step in freeze-drying is the preparation. The food may be processed from cooked products or raw products. Some products may need to be sliced, diced, granulated, powdered, or liquefied in order to keep the freeze-drying time to a minimum. The food is then frozen quickly. This results in the formation of small ice crystals which will not cause rupturing as much as large ice crystals. After the food is frozen, it is placed on trays which hold two to three pounds of products per square foot. The trays are placed in a freeze-dry cabinet from which the air is then pumped out to lower the pressure. At low pressure the water is removed from the food product by sublimation. Sublimation is the process in which the ice crystals in the food change to a vapor without passing through the liquid state. Heat may be applied to the product to hasten sublimation. After the product has lost substantially all of its moisture, it is considered freeze-dried. The cabinet is backed-flushed with nitrogen, and the product is then packaged. Packaging must be done in a container that is moisture-proof and air proof. Oxygen should not be allowed to come in contact with the product because of undesirable oxidation of fats and other food components that may cause damage to the flavor and color.

Today the most important application of freeze-drying appears to be in the meat industry with products such as beef, pork, chicken, and fish. Pieces of meat that are about one inch thick can be freeze-dried readily. Thus, steaks, chops, and fillets are especially suited to the process. Another important application of freeze-drying is to preserve the various ingredients of dried soup mixtures. Such ingredients, when rehydrated, provide natural color and flavor in soups.

Various fruits and vegetables have been freeze-dried on an experimental basis. These products, while having good quality, do not yet justify the higher costs involved in comparison with present methods of preservation.

The advantages of freeze-drying are in improved quality and color of products and in lower storage and transportation costs. If costs of producing freeze-dried foods can be reduced further, it is likely that they shall become more common on the supermarket shelves.

Food technology major Dona Hallum places fruit in the freeze-drying unit used for preparation of freeze dried foods in the laboratory.

Investor-owned SCEGCO 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.
The Economic Importance Of Timber

By Danny Lamb, Forestry, '64

The nation’s economic activity is measured in two widely accepted ways—gross national product and employment. Few people realize the important role that the timber industry plays in our country’s economic activities. Let’s first look at the effect the timber industry has on the gross national product ... the market value of all goods and services produced in the country. In 1958, the sum of all the values of goods and services of the timber industry amounted to 25 billion dollars. This represents nearly 6 per cent of the nation's gross national product. In other words, one dollar out of every 18 dollars of the gross national product originated in some kind of timber-based economic activity. These figures are comparable to practically every industry in the United States.

In 1958 employment attributed to timber in all timber-based industries amounted to the equivalent of 3.3 million people. This represented better than 5 per cent of the total civil employment in the United States—and meant that one out of every 20 employed was engaged in some kind of timber-based economic activity. Again, these figures can be matched by few other industries in the United States.

Fortunately the forests are renewable resources and will continue to play their important role in the nation’s economy ... if wise management practices are followed. In the last few decades the forest management programs of public agencies, forest industries, and many private landowners have expanded rapidly. As a result, most of the timber now cut represents in some degree the product of management.

Only through the practical application of science, technology, and economics will the timber industry continue to grow and provide for this country its most valuable asset.

ASAE News

By Joe Brown

The ASAE had a cotton project this year through which were procured funds for financing the activities of the club which include: The Georgia Banquet, the field trip, and the safety program.

Several senior members attended the South Carolina Section ASAE meeting in Columbia. The theme of the meeting was “Engineering Efficiency — A Foundation for Profitable Agricultural Business.” Among the topics covered were: Opportunities and Problems of Farm Equipment Merchandising; Opportunities of Farmstead Systems Engineering; Problems of Conservation Contracting; Making Mechanization Manageable; Opportunities for Treated Wood in Farm Structures Contracting; and Meteorology—An Aid to Mechanization Efficiency. The afternoon of the second day of the meeting included a tour of the Parr Schools Nuclear Plant.

The ASAE has promoted a safety project to initiate the adoption of a standardized slow moving vehicle recognition sign in the Southeast. This sign is of a triangular shape and is easily recognizable day or night. Its purpose is to instantly inform drivers that a slow moving vehicle is ahead.

The ASAE has been fortunate in having exceptional programs and speakers such as Mr. Nutt, Director of Agricultural Extension Service, who spoke on the European Foreign Market and Its Potential as a Market for United States Goods; and Mr. Garner, Engineer in Charge of the USDA Southeastern Cotton Ginning Laboratory, who spoke on Agricultural Research Service and Its Work.

The annual Clemson-Georgia banquet was held on April seventeenth. This year the Clemson Chapter of ASAE was host. Steaks were enjoyed by all after which Mr. Finch of the Texize Corporation in Greenville presented a very enlightening speech.

The Clemson Chapter of ASAE went on a field trip the latter part of April. This included a visit to the National Tillage Laboratory at Auburn, Alabama. After this, the club traveled to Albany, Georgia, where they visited the Lilliston Implement Company.

Two new members, Carl Brown and Jim Gibson, were inducted this semester, bringing the student membership to twenty.
**Clemson ADSA News**

**By Gene Merritt**

The members of the Dairy Club feel that we were indeed fortunate to have Miss Sue Ann Goodridge, the American Dairy Princess, with us during homecoming weekend. Sue Ann was escorted by Larry Gause and Gene Bennette during her stay, and her visit was covered by press, radio, and television. Also during homecoming activities the Dairy Club prepared a very attractive display.

The December 10 meeting of the Dairy Club was held in the lobby of the Food Industries Building for the formal initiation of new members.

The Clemson Dairy Club is now under the capable leadership of a new president. Serving as the newly elected president is Jimmy Williams, with Shuler Houck serving as vice-president and Gene Merritt as secretary-treasurer.

Jimmy Williams, Shuler Houck, Jon Rogers, and Gene Merritt, along with Club advisor Dr. J. T. Lazar, attended the Southern Agricultural Workers Convention in Atlanta, February 3 through 5, 1964. The members were very pleased to talk with Dairy majors from other schools and exchange ideas and opinions. Gene Merritt was elected president of the Southern Student Division of the American Dairy Science Association.

The Clemson Dairy Club meetings are now announced by the “Bull Boards” prepared by past president Larry Gause. Plans are now being made for charts to be placed in various locations giving a nutritional comparison between several favorite drinks and milk.

The Dairy Club’s year is highlighted by a banquet. At the banquet various awards are given to outstanding students. The banquet was held on April 28 this year.

All members of the Dairy Club were certainly saddened by the recent death of Mrs. B. E. Goodale. We extend our sympathy to Professor Goodale and his family.

**Chemical**

(Continued from page 8)

mined by the discovery and development of more selective, more specific, better formulated, more efficient, safer, and more economical herbicides. A better understanding of the limitations will determine the potential development of new and more effective control techniques. This, in turn, will help determine the effectiveness of man’s never-ending problem with weeds.

**Farm Of**

(Continued from page 9)

raw materials, and has made available an increasing share of the national labor force for nonagricultural employment.

In turn, we, the people in agriculture, must look into and think about the FARM and the FARMER of the FUTURE.

**Horticulture Club News**

**By Dale Brown**

This year the Horticulture Club at Clemson has been fortunate to have had many interesting and rewarding moments on its agenda. Some of the most interesting were: the twice a month meeting, at which different well-known speakers spoke on different aspects of horticulture; the annual trip to the Southern Agricultural Workers Convention, which was held in Atlanta, Georgia; the many projects such as the selling of jelly to finance the Atlanta trip and the selling of coleus plants to help finance next year’s convention which is to be held in Dallas, Texas, and also private trips on the part of some of the members to such places of horticultural interest as Callaway Gardens at Pine Mountain, Georgia, and the Southeastern Flower and Garden Show at Charlotte, North Carolina.

At the Southern Ag. Workers Convention in Atlanta this February 2, 3, 4, and 5, the Clemson Collegiate Chapter of the A. S. H. S. had more than twice as many members present as any other school. Aside from everything learned at this convention, many influential people were met by everyone, and even if the president of the collegiate branch doesn’t come from Clemson next year, as it did this year in Ronnie Robbins, we did manage to get Maurice Ferree elected as vice-president.
Choose from these outstanding

**COKER CROP VARIETIES for '64!**

**COTTON**
- Coker Carolina Queen
- Coker 100-A

**HYBRID CORN**
- Yellow
  - Coker 15
  - Coker 67
  - Coker 71
- White
  - Coker 811A
  - Coker 811
  - Coker 911

**SOYBEANS**
- Coker Hampton
- Coker Stuart

**TOBACCO**
- Coker 319
- Coker 187-Hicks
- Coker 111
- Coker 80-F
- Coker Hicks Broadleaf
- White Gold

**OATS**
- Coker Moregrain
- Coker Suregrain
- Coker Victorgrain 48-93

**WHEAT**
- Coker Hadden
- Coker 47-27

_COKER'S PEDIGREED SEED CO._
HARTSVILLE, SOUTH CAROLINA

_COKER 911—This outstanding full-season corn holds more official yield records than any other adopted white hybrid — including South Carolina's state-wide record of 227 bushels per acre! Has excellent standability, comes through in good seasons or poor. Preferred by dairymen for big yields of high T.D.N. silage._