THE KANSAS AGRICULTURAL STUDENT

VOL. II, NO. 2 DECEMBER, 1922

MANHATTAN, KANSAS

CONTENTS

VOCATIONAL STUDENTS POULTRY LABORATORY

In this laboratory the students carry the work through a yearly cycle. They hatch and rear the chicks, grow out the pullets, and carry them through a winter's laying.

The Kansas Agricultural Student

VOL. II Manhattan, Kansas, December, 1922 NO. 2

Artificial Illumination Profitable Under Skillful Management

B. A. Campbell, '25

The hen on the modern commercial poultry farm knows no union hours. Nor does the daylight-saving plan give her sufficient time to contribute her full share to America's breakfast of "ham-and." Therefore the modern poultryman resorts to lengthening her day by artificial lights. Now at 4 a. m. the automatic clock turns the long winter night into day for the winter layers.

A few years ago this idea of giving the egg producers an 8 o'clock lunch or rousting them out a few hours earlier in the morning for their daily task of filling the egg baskets was considered a huge joke by many poultrymen. Recently, however, a great many careful experiments have been conducted to determine the actual value of such artificial illumination for increasing winter egg production. The use of lights when combined with good management has been found to give satisfactory results in all cases.

The modern hen is a high-capacity machine that responds generously to careful management. This machine must be maintained before eggs can be produced. Her food ration must furnish not only maintenance but also materials for production. If the raw materials are limited to a maintenance ration, production will suffer accordingly. During the short winter days the hen cannot consume enough materials for maximum egg production because her crop is not large enough to store sufficient feed to meet the demands. The use of lights shortens the time between feedings.

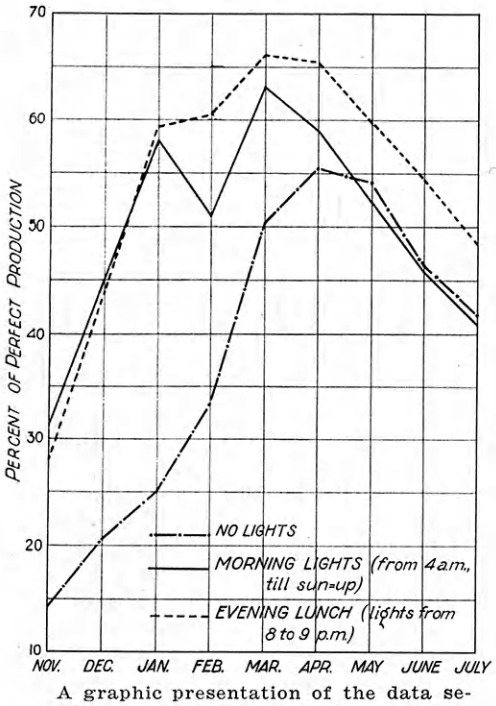
When lights are used the birds should be graded according to age, condition, and laying qualities. To secure the best results each class of birds should be handled in a certain definite manner. Lights for pullets should be started on November 1 and used until April 1. With hens, lights should be used from January 1 until April 1. The reason for starting late in the season with hens is that they are usually in poor condition after the fall molt and must regain their weight before being crowded for eggs. The effects of lights will show in a week or ten days with pullets, but hens do not respond so readily. It is advisable to use pullets for egg production and to save the high-producing good-vitality hens for mating. Birds for breeding purposes should not be under lights as the hen needs all her vigor to produce chicks of good vitality.

Birds under lights will consume more feed and drink twice as much water as those under normal conditions. When using the morning system, lights are turned on 10 minutes before daylight the first morning and 10 minutes earlier each morning thereafter until they have been advanced to 4 a. m. They are then turned on regularly at 4 a. m. each day until they are taken away by the same regular and gradual process by which they were introduced. When the lights come on the birds hop down from their roost and scratch for the grain which is usually placed in a litter the night before. A second heavy grain feed is given about 4 p. m. Green feed is fed at 9 a. m. Fresh water, buttermilk, and a good laying mash should be before the birds at all times. To keep up high egg production all winter, the birds should be kept

indoors while the lights are on and during the coldest weather.

The evening lunch system of feeding consists in turning the lights on at 8 p. m. and leaving them on for an hour. This system has proved less satisfatcory than the morning lights at the Kansas Agricultural Experiment Station, while at the New Jersey Station the evening lunch system is given preference. The data from New Jersey shown in the diagram cover a period of nine months. The following numbers of pullets were included in the test: Without lights, 600 pullets; morning lights, 500; and evening lunch, 100.

Emphasis should be placed on the necessity of carefully regulating the hours of lighting. If properly operated, the use of lights will increase winter egg production and make it possible to carry February hatched pullets through the first fall with less molting. When the lights are used irregularly they will cause the birds to go into a molt, resulting in a decided decrease in egg production and in lowering the vigor of the birds. Molting will also occur when lights are turned on too quickly in the fall and off too early and too abruptly in the spring.



A graphic presentation of the data secured at the New Jersey Agricultural Experiment Station on the influence of electric lights on egg production.

Significance of Sorghum Improvement to Kansas Agriculture

E. R. Ausemus, '23

Sweet sorghum was one of the first crops grown in Kansas. In 1886 kafir was introduced by the Kansas Agricultural Experiment Station and has gradually increased in importance since that time. Feterita was first grown extensively in 1913 when it attracted much attention because of its ability to produce grain in exceptionally dry seasons. The acreage of the sorghums in Kansas is now almost double that of alfalfa and is second only to wheat and corn.

The aim of all crop improvement is to produce high yields of a better quality and to produce them more profitably. Sorghum improvement may be obtained in three ways: Introduction of new varieties; seed selection; and development of new varieties by the crossing of two or more existing varieties.

Sorghum belongs to a naturally self-fertilized group of farm plants. However, sorghums more frequently cross fertilize than almost any other self-fertilized plants. Normally the flowers are pollinated from the higher flowers of the same panicle but often the pollen is carried from one plant to the other by such agencies as the wind and insects. The amount of this cross-pollination depends to some extent on the structure of the panicle, being greater in the lax than in the close form of panicle. Two or three varieties of sorghum are often found growing on one farm as an insurance against complete crop failure. The dangers of natural crossing among these various varieties can readily be seen.

Until very recently sorghum improvement has been accomplished principally through

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"Bell's Five" Win for the Aggies

E. H. Jackson, '23

COACH BELL AND HIS EIGHT BEST LIVESTOCK JUDGES, 1922

Five students from this group placed first at the American Royal and five third at the International. From left to right they are: F. W. Bell (Coach), C. C. Button, L. M. Knight, Donald Ibach, F. H. Paulsen, Thomas Cross, C. G. Russell, F. W. Houston, and W. P. Raleigh.

The winning of first place at the American Royal this year by the Aggie stock-judging team seems to be an indication that "Bell's Five" bid fair to become as famous in agricultural circles as "Bach's football eleven" in the Missouri Valley. From a field open to the entire United States seven teams from territory tributary to Kansas City met at Kansas City, November 18, and debated the relative merits of the best known show stock competing at the American Royal.

Competition for places on the team was unusually keen. In the first place 25 men turned out to try for places on the squad. From this number eight men vied closely for the honor of making up the final five. Prof. F. W. Bell found the problem of selection so difficult that all eight accompanied him to Kansas City. He finally entered the following men: Charles G. Russell, C. C. Button, W. P. Raleigh, Donald Ibach, and L. M. Knight. Those remaining with the team were: F. H. Paulsen, Thomas Cross, and F. W. Houston. The Aggie men placed well for individual honors. First place went to a Texas man, Glenn Lindsay, but second was taken by Russell and third by Button. The other men placed as follows: Raleigh, tenth; Ibach, fifteenth; and Knight, sixteenth. The placings of the teams entered were based on a possible score of 3,000 points. The competing teams made points as follows: Kansas, 2,698; Texas, 2,631; Iowa, 2,631; Nebraska, 2,602; Missouri, 2,592; Ohio, 2,580; and Arkansas, 2,416.

Immediately following the contest the men commenced further work on the available stock in preparation for the acme of all stock-judging teams, the International Livestock Show at Chicago, December 2. After

six days of grueling drill Professor Bell was still unable to eliminate two men to return to Manhattan and started with the eight to Chicago. On the way the squad will take advantage of a week's intervening time to visit some of the leading stock farms of Iowa and Illinois as well as the foremost agricultural college herds of this section of the country.

The competition at the International will be against possibly 25 of the leading colleges and schools of agriculture of United States and Canada. Thus the distinction of placing or securing honorable mention in this event will be an indication of a well-coached and a well-trained team.

Cows Capable of Transmitting High Production to Progeny Mark Milestones in Dairy Industry

R. L. Fleming, '23

When the first 30,000-pound milk record was made, such a performance was considered almost miraculous, and an animal capable of this production was valued highly. Since that time, however, milk records have been broken again and again. Recently the top place was taken by Segis Pietertje Prospect when she produced 37,384 pounds of milk in one year, a daily average of 102 pounds, or 11.8 gallons.

Before cattle were domesticated each cow produced only enough milk to support her calf until it was able to care for itself. Since that time milk production has been developed by means of selection and careful breeding, until we have the present type of high-producing cows.

High producers are often given a long rest before their work begins. They are then in the best of condition at calving time and are "forced," as one might express it, to a high production by the heavy feeding of highly concentrated feeds. This method may result in the constitution of the cow being sacrificed for high production. Unless an individual can duplicate her previous record and also transmit high production to her progeny, she is not a factor in the real development and advancement of the dairy industry.

It is seldom that an individual having a record for production along with a good progeny record can be found. Plain Mary, ex-champion fat producer in the Jersey breed, died within a year after making the record. A son of the world's champion milk producer recently sold for only $5,000, which goes to show that he was not an outstanding individual. Owl's Design, a Jersey cow owned by K. S. A. C., once held the state record for fat production in the Jersey breed, but her progeny are poor producers, none of them approaching the production of their dam.

Garclaugh May Mischief, champion milk producer in the Ayrshire breed, has to her credit, besides this milk record, the production of 12 calves in as many years, and still shows vigor and constitution. One of her sons, Penshurst Mischief Maker, was sold for the highest price previously paid for a sire. Financial King's Interest, a Jersey cow 21 years of age, has produced 20 calves, 19 of them being heifers, in 19 years and was at one time a high milk producer.

An individual which has been of great value in upbuilding the college dairy herd is the Ayrshire cow, Canary Bell. At the present time she holds the state record for fat production in the Ayrshire breed and for several years was the state champion fat producer. One daughter, Melrose Canary Bell, was the champion producer in her class for the year 1917. Another daughter, Melrose Canary Bell 2d, was world's champion in the Honor Roll Division. All daughters of this individual are now in the college herd producing and reproducing. Perhaps sometime in the future the entire Ayrshire herd at K. S. A. C. will trace back to Canary Bell. The value of this individual has not been due to production alone, but also to the transmission of this quality to her progeny and it is only by such individuals that the dairy industry can be developed, maintained, and carried on most successfully.

Winter Care of House Plants

W. B. Balch

A GROUP OF HOUSE PLANTS

These plants are easy to grow and beautify the home. They are: 1. Narcissus. 2. Christmas Cherry. 3. Asparagus Fern. 4. Tuberous Rooted Begonia. 5. Begonia.

There are four important factors in the winter care of house plants: Temperature, watering, light, and soil.

One of the main sources of difficulty in growing plants indoors in the winter is that in the average home the temperature, with regard to the welfare of the plants, is neglected. During the day the temperature is kept higher than the optimum for most plants. This results, if other conditions are favorable, in a large amount of tender unhealthy growth. At night the temperature is allowed to go down to a point most unfavorable to plant growth. The tender parts developed during the forcing conditions of the day are most severely set back by the cold of the night. Extreme conditions are not only disastrous to the plant physiologically but also are favorable to the development of diseases and some insects. Moreover the plants are more seriously affected by diseases and insects because of their weakened vitality. Extremes of temperature are among the chief causes for failure in wintering house plants.

It is often quite impossible to have several temperatures in the house at the same time and though a high temperature is normally better for some plants than others, all will adapt themselves to an average temperature and do very nicely if the day temperature is constant and the night temperature about 10 degrees lower.

Next to temperature in its importance in the wintering of good house plants, is water. Some persons who have grown plants for a number of years and have learned that temperature extremes are fatal have failed to observe that atmospheric conditions indoors are not the same as those out-of-doors. The air in a steam-heated office building is nearly as dry as that of the Sahara desert. The air in an apartment heated by hot water is usually

(Continued on page 62.)

Combination Swine Experiment Yields Interesting Results

J. L. Van Gilder, '23

Some practical and interesting information has been secured from a 120-day hog-feeding experiment just completed by the Department of Animal Husbandry. The object of this test was three fold: First, to determine the exact value of tankage in a corn and alfalfa ration for pigs; second, to ascertain the value of feeding upon a concrete floor; and third, to compare the relative feeding value of Sudan and alfalfa pastures.

Four lots of 10 pigs each were used in the experiment. They were as nearly uniform in condition and weight as possible. All the dry feed was hand fed. Lots 1, 2, and 3 had free access to alfalfa pasture and lot 4 to Sudan grass pasture. Full details regarding the feeding plan and the results obtained at the end of the 120-day test are given in the following table:

RESULTS OF A 120-DAY FEEDING EXPERIMENT SHOWING VALUE OF TANKAGE FED WITH CORN TO PIGS ON ALFALFA PASTURE AND THE VALUE OF A CONCRETE FLOOR FOR FEEDING SWINE; ALSO COMPARATIVE VALUE OF SUDAN GRASS AND ALFALFA PASTURES

Lot No.	1	2	3	4
Number of pigs in lot	9	10	10	10
Pasture	Alfalfa	Alfalfa	Alfalfa	Sudan Grass
Protein Supplement	None	Tankage	Tankage	Tankage
Feeding floor	Concrete	Dirt	Concrete	Dirt
	Pounds	Pounds	Pounds	Pounds
Av. initial wt. per pig	71.30	72.27	72.33	72.87
Av. final wt. per pig	159.96	219.63	222.10	215.83
Total gain per lot	798.00	1,473.66	1,497.67	1,429.66
Av. daily gain per pig	.74	1.23	1.25	1.19
Av. daily ration:				
Corn	3.29	4.19	4.19	4.19
Tankage		.25	.25	.25
Feed required for 100 pounds gain:				
Corn	444.86	340.78	335.32	351.27
Tankage		20.36	20.03	20.98

Lot 2 received the same ration as lot 1 with the addition of 0.25 of a pound of tankage per head per day. A careful comparison of the two lots reveals the fact that the pigs of lot 2 that received the tankage gained nearly twice as much as those of lot 1. Lot 2 also showed more finish and bloom. The alfalfa pasture of lot 1 was badly rooted and the pigs displayed a lack of appetite. These results make it plainly evident that protein is a necessary factor for growing and fattening young hogs.

Practically no difference between these lots was shown at the end of the experiment. However, due to the extreme dry weather this experiment would not prove a satisfactory test as to the value of a concrete floor. A feeding floor is an essential part of the swine raiser's equipment, as it promotes sanitation and saves feed, time, and labor. It is also more satisfactory to both man and animal to have a dependable spot where feed may be conveniently placed and consumed under acceptable conditions.

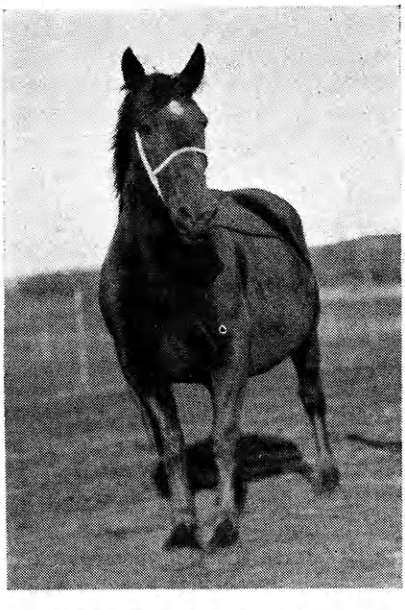
Lots 2 and 4 received the same ration of corn and tankage. Lot 2 had access to alfalfa pasture and lot 4 to Sudan grass pasture. A glance at the table shows that there was a small advantage in favor of alfalfa pasture. This may be accounted for, however, by the fact that owing to the weather the Sudan grass dried up before the experiment was completed and no extra green feed was added in its place. A light crop of hay was harvested from the Sudan lot early in the experiment. The results indicate that Sudan grass is an excellent forage for swine when only a temporary pasture is desired.

Lots 2 and 3 received the same ration (corn, tankage, and alfalfa pasture), the only difference being that lot 2 was fed on a dirt floor and lot 3 on a concrete floor.

Show Ring Record of Her Foals Places V. Laura in the Limelight

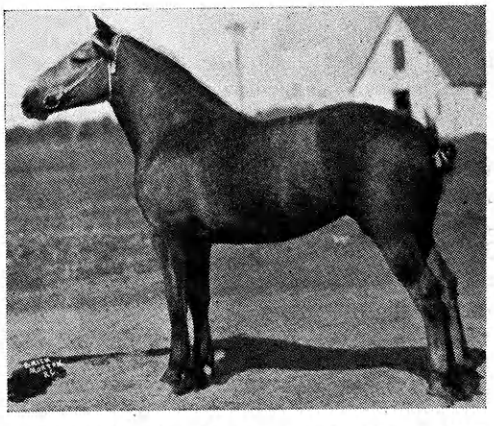
Thomas Cross, '23

The Percheron mare, V. Laura 121025, is one of the most outstanding producers in the college stud. "Bobby" as this mare is commonly called is a rather small black individual weighing approximately 1,700 pounds when in good flesh. She is not an especially attractive mare because of her size, but has good type and extremely fine quality. V. Laura has proved her ability to transmit these characters to her offspring which is a most desirable trait in a breeding animal. This fact is borne out by the record of her three offspring in the show ring against strong competition at the two state fairs. Although the foals were by different sires none of them have been defeated in their class. This performance is considered an enviable record among horse breeders.



V. LAURA—Purebred Percheron mare, noted for the champion caliber of her progeny.

V. Laura was foaled April 2, 1915. She was sired by Jungo 71637, an imported son of Carnot 66666. Her dam was Keota Suzie by Imported Tripoli. V. Laura was purchased from her breeder Thos. Singmaster of Keota,



ALLINE—Purebred Percheron Filly, daughter of V. Laura.

Iowa, together with several other mares in 1915. She was placed in a nutrition experiment upon her arrival at the college, a fact which probably accounts for her lack of size and development.

In 1919 "Bobby" produced the stallion foal, Alcar, sired by Maplegrove Clarian, a son of Jalap. The colt was shown at the two state fairs as a yearling in 1920. He was first in his class at Topeka, and at Hutchinson was first in his class and also Junior Champion. Alcar was sold in the spring of 1921.

In 1921 this mare produced a filly foal, Alline, sired by Big Ben 150327. Alline stood first in the open class of yearling fillies and first in the special for yearling fillies at the Kansas Free Fair. She was made junior Champion and later Grand Champion mare of the Hutchinson State Fair, defeating the mare that was Senior and Grand Champion at the Kansas Free Fair, Topeka. At the American Royal she stood second in the open class, standing next to the filly which was

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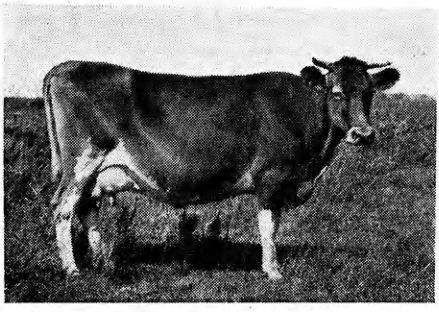
Association Testing Ferrets Out Loafers and Finds the Best Producer

Harry A. Rust, '26

The highest cow-testing association record for any grade cow in Kansas was made by "63" a grade Guernsey owned by C. E. Wallace and Sons of White City. She produced on association test, 15,101 pounds of milk and 653.2 pounds of butterfat in 365 days. This is the highest record made by any Guernsey in Kansas. The association records also show that "63" gave more milk, only 90 pounds less butterfat, and consumed $44.67 worth less feed than the four low-testing cows. Though the gross value of the products from the four cows exceeded that of "63" by $64.20, the net return over feed cost was only $9.53 more than that made by this one good cow.



NO. "63"—A grade Guernsey holding the highest record of any grade cow tested by the cow-testing associations of Kansas. Her production is approximately four times the production of the average Kansas cow.

A cow-testing association, such as the one in which this good record was made, is an organization of dairymen formed for the purpose of obtaining records on their entire herds. The testing is done by a competent man employed by the association and under the supervision of an Extension dairyman of Kansas State Agricultural College. Monthly and yearly records are kept of production and feed consumed. Special herd books, prepared by the United States Department of Agriculture, are provided without cost. These books are used in keeping the records. The tester visits the farm of each member of the association one day of each month. He weighs and tests one day's milk and computes the butterfat production for the month. Monthly reports of all herds tested are sent to the college. These reports are compiled in a monthly "News Letter" which is mailed out to each member of all the cow-testing associations in the state.

The Wallace herd is a good example of the value of cow-testing work. Prior to May 1, 1921, no accurate records had been kept. At the close of the first testing year Mr. Wallace had a complete yearly record on 18 of his cows. With these facts at hand he was able to look through his herdbook and tell which were his most profitable cows.

By an examination of this herdbook it was found that none of the Wallace cows were slackers, the lowest cow in the herd giving a net return of $40 over the cost of feed, the highest, "63," giving a net return of $182 over feed cost. The average production in Mr. Wallace's herd was 7,927 pounds of milk and 350.9 pounds of butterfat, which is more than double the production of the average Kansas cow. Mr. Wallace used a balanced ration composed of a variety of feeds. During the testing year he supplied silage, alfalfa hay, native bluestem pasture, corn, oats, kafir, bran, shorts, and linseed oilmeal. The grain ration usually was composed of corn, oats, bran, and linseed oilmeal. It was fed throughout the entire year at the rate of 1 pound of grain for each 3 to 4 pounds of milk produced.

In the spring of 1922 Mr. Wallace found the herd to be larger than he could handle conveniently and sold 20 head of cows and heifers. He states that his herdbook records made it possible for him to receive $25 more for each of his cows than he might otherwise have expected to receive. He also knew which cows were the most profitable and was able to retain them. This fact was worth more to him than the increased value of the stock sold.

Better Diversification the Master Key to Farm Profits

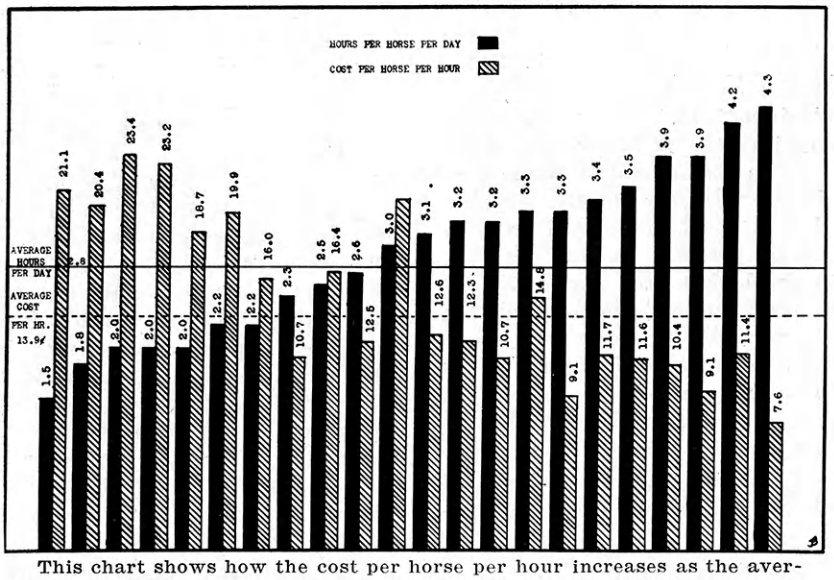
Samuel Pickard, '23, in the Weekly Kansas City Star

"I bought a pig last fall for $5, fed him $5 worth of corn, and sold him in the spring for $10.00," observed a good-natured Kansas youth who attended the Older Boy's Conference held at the college this month. "I didn't make much on this particular pig," he added with a smile, "but, of course, I had the use of him all winter."

This lad's bit of wit characterizes exactly the thing that has happened to the Kansas farmer as well as the spirit he has shown since the old saying "all that goes up must come down" has become applicable to war prices of farm products.

Although red has been the fashionable color in figuring farm incomes, for those who have had the courage to calculate them, many farmers have prospered. Certainly they have not fared so well as during the war, but a few have made something more material than just the opportunity of getting ample exercise and fresh air.

Just why did some of these farm operators manage to show profits last year when the majority were going deeper in the hole? Is the difference due to the fickle jade called luck? No! That is the emphatic answer which resulted from detail cost of production studies made in Jackson County last year by the Department of Agricultural Economics. The differences found in the cost of horse and man labor alone on 22 representative farms make it startlingly evident that the less diversified farms can not long compete in the struggle for profits in the present period of extremely narrow margins. The relation of the cost per horse per hour to the average number of hours of work per day on each of the 22 farms studied is shown in the diagram.



This chart shows how the cost per horse per hour increases as the average hours' work per day decreases. The 22 columns represent the 22 farms studied in Jefferson County.

The Jackson County farmer who secured an average of 4.3 hours per day from each horse at a cost of only 7.6 cents per hour had a well diversified farm which provided the

opportunity to distribute more evenly the horse labor over the working days of the year, thereby greatly reducing the cost per hour. His farm contained 160 acres. The combination of 30 acres of corn, 20 acres of wheat, 15 acres of oats, and 30 acres of alfalfa kept him and his four work horses busy during the spring months. By exchanging labor at threshing time there was no horse shortage. During the winter months his horses were kept fairly busy hauling feed and manure. He kept about the maximum number of livestock his farm would support, including, on the average, 8 head of horses, 45 cattle, and 30 hogs.

The farmer included in this cost of production study, whose horse labor cost more than 21 cents per hour, had the same sized farm and practically the same acreage in crops. He did not, however, have the variety or combination of crops that provided a good distribution of horse labor. It was necessary for this farmer to keep 7 work horses because the bulk of his work pyramided at one season of the year. As regards the livestock other than horses, he had less than half as many as the first farmer.

It is a significant fact that the smallest horse labor cost on the 22 farms studied belongs to the farm that averaged the largest number of hours' work per horse. Also, the farm with horses that worked the smallest number of hours per day was the one that had next to the highest cost per hour for horse labor. Few farmers would permit the hired man to go to the haymow every afternoon for a nap or be content with 4.3 hours work per day. Yet, statistics prove that, on the average, team labor costs the farmer more per hour than man labor.

The value of the better diversified system of farming is just as apparent when we compare these same 22 farms in regard to the cost of man labor. The lowest cost per hour on any farm was 15.4 cents; the highest, 28.3 cents. The lowest number of hours worked by any operator per day was 4.1; the highest, 12.2.

In both cases these extremes in cost of labor can be traced back to farms which differ chiefly in regard to the skill with which they are diversified. The relative cheapness of both horse and man labor is invariably associated with the system of farming that provides a good distribution of labor and a full year's work. Furthermore, an intelligent system of diversification provides greater efficiency in the use of land and capital, eliminates risk, and yields a more steady income. A good system of diversity affords an effective system of fertility maintenance, insuring for the farmer a permanently prosperous agriculture.

Diversification, skillfully applied, is the master key that will unlock most of the closed avenues to prosperity on the Kansas farm. According to Prof. W. E. Grimes, head of the Department of Agricultural Economics of the Kansas Agricultural Experiment Station, it is possible for the Kansas farmer to double his net profits by the most efficient use of this system.

The cow, sow and hen type of mixed farming has been heralded from press and platform as the panacea for all the present agricultural ills. However, this old reliable, tried and proved remedy is only as effective as the degree of skill with which it is applied. A half dozen important sources of income do not necessarily characterize a well diversified farm unless the principal enterprises provide a good distribution of labor and a full year's work. Usually a better diversification can be secured by the shifting of crop and livestock enterprises.

Twenty teams of three men each competed in the intercollegiate dairy judging contest held at the National Dairy Expositon at St. Paul, Minn., October 9. The Kansas team composed of F. W. Houston, R. L. Fleming, and C. R. George placed eighteenth. C. R. George was eleventh high individual in the contest. Prof. H. W. Cave, coach, and A. P. Wertman, alternate, accompanied the team.

G. C. Anderson, '21, member of the dairy judging team of 1919-20, is now in the Department of Dairy Husbandry of the College of Agriculture, University of Idaho, Moscow.

Ray Ferree, '21, is enjoying his work in southwestern Kansas. For his major project, Mr. Ferree is director of vocational agriculture in the Satanta Rural High School.

Scientific Feeding and Management Make Pork Production Pay

Kenney L. Ford, '24

E. C. Carp and Fred Carp, '18, of the firm of Carp Brothers of Wichita have by their own initiative and scientific business methods built up the greatest pork-producing plant in the state of Kansas.

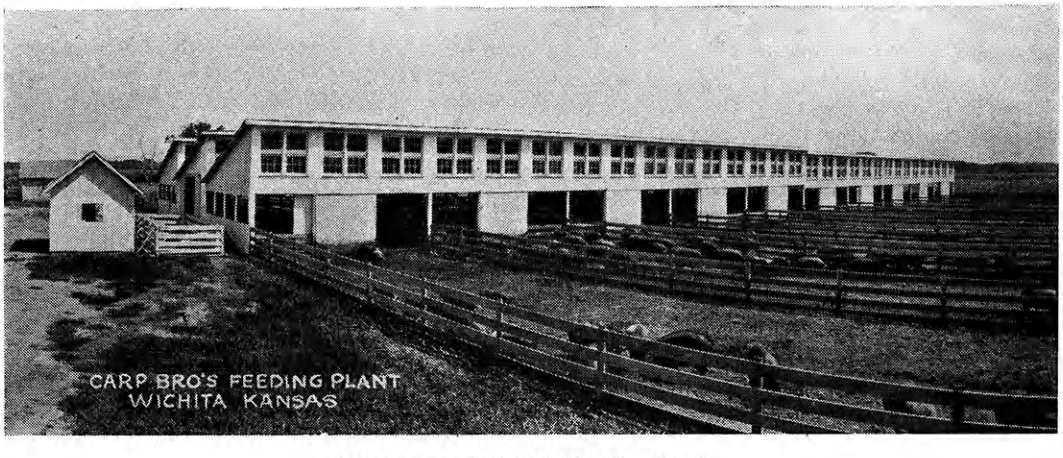
Carp Brothers fatten hogs on a purely commercial basis. They make no attempt to raise any of their feed or any of their pigs. Their entire plant is located on a 30-acre tract of land adjacent to the Midland Valley Railroad south of Wichita.

Believing that the labor saved by having feed convenient and that the proper housing of fattening hogs, in providing dry sanitary quarters, will greatly reduce the cost of producing pork, Carp Brothers have erected the 15,000-dollar feeding plant shown below. The building faces south, is 73 by 300 feet with concrete floors and troughs throughout. It is divided into 24 pens, each 24 by 32.5 feet and each equipped with two self-feeders.

Over 5,000 head of hogs are fattened in this plant annually. Carp Brothers go out personally and buy up in Kansas, Oklahoma, or on the Wichita markets carload lots of feeding pigs averaging about 100 pounds, which after 40 to 90 days feeding are ready for market. Carp Brothers make no preference as to the breed or breeding but buy on the basis of the pigs' feeding merits. They prefer pigs that have been vaccinated but buy many that are not and do the vaccinating themselves.

Many experiments have been made by Carp Brothers in trying out different feeds, but they eventually came back to these three feeds, which are to be found in each self-feeder: Corn, shorts, and tankage. Shorts is not fed unless it can be bought as cheaply as corn. Kafir and milo are valued at about nine-tenths of the same weight of corn. Soybean meal was tried out but difficulty was experienced in getting the pigs to eat it satisfactorily. In addition to the three feeds fed in the self-feeder, all the fresh buttermilk that the hogs will drink is hauled daily from the creamery.

An enterprise of this kind successfully operated commands the admiration of all agriculturists. Back of it stand the personalities of Carp Brothers, persevering, intelligent buyers, always familiar with market demands and fitting their products to meet these demands. Lastly, scientific feeding and housing methods minimize the cost of production. These factors enable Carp Brothers to prosper on the margin paid for fat hogs above feeders in the greatest of all industries—that of supplying the world with cheap food.



A REAL PORK-PRODUCING PLANT

Importance of Vitamins in the Proper Functioning of Animal Life

W. D. Foss, '23

Vitamins are a group of substances of unknown origin but essential to normal metabolism. They are present in very small amounts in natural foodstuffs and have been classified as follows:

I. Vitamin A, which occurs abundantly in the leafy parts of plants, butterfat, egg yolks, cod liver oil, and many other foods, and which is associated with growth and in some manner with the prevention of rachitic tendencies.

II. Vitamin B, the antineuritic vitamin occurring especially in the cuticle of seeds and in milk, meats, eggs, and yeast.

III. Vitamin C, the antiscorbutic vitamin occurring in milk, citrous fruits, tomatoes, root vegetables, and in a great many plants commonly used as food by man and animals.

The investigation of these unknown but essential dietary constituents, is made difficult by the fact that they are present in the food and required by the body in extremely minute amounts. Furthermore the amount of vitamin in a class of food varies with the condition under which it grows, and the requirements for animals of different species are also variable. Nor do the animals of the same species require the same amount of vitamins at different ages and periods of growth. So far as is known, none of the vitamins is elaborated in animal tissue but comes originally from the plant foods consumed. Fortunately the unknown dietary substances are fairly widely distributed in the ordinary foodstuffs.

It has long been known that the effect of heat on vitamins varies with the reaction and other factors. Most vitamins are more readily affected by heat in an alkaline than in an acid medium.

The so-called nutritional or deficiency diseases are perhaps caused by the lack of some such unknown substance as vitamins. The disease known as beri-beri, prevalent in oriental countries where the natives live on a diet consisting mainly of polished rice, causes intensive nervousness resulting in weakness, paralysis, and ultimate death. Feeding the outside layer of rice, ordinarily removed in polishing, gives immediate relief and recovery except in the most extreme cases. The condition known as rickets was formerly ascribed entirely to the lack of adequate amounts of mineral matter in the diet. However, other factors such as sunlight and the influence of vitamin A have been shown to be evident. Experiments have shown that the use of cod liver oil in goats is able to change a negative calcium balance to a positive one. In other words, the vitamin seems to assist in the utilization and conservation of the lime salts present in foods.

Just why the body needs these materials and the functions which they perform are matters as yet obscure. Possibly they stimulate or regulate the functioning of certain tissues or cells or it may be they are used as materials for the construction of certain products of internal secretion which are required in the process of metabolism. Time may show that their present classification must be rearranged and enlarged and that many conditions attributed to these substances are in part due to other factors to which vitamin deficiencies merely predispose the animal.

H. B. Winchester, recently Associate Professor of Animal Husbandry, writes from O'Neill, Nebr., November 11: "We are today in the grip of a blizzard," which he further says caught them with their cattle on pasture and no corrals ready for winter. Mr. Winchester has a real problem in farm management on his hands in that section of the country, but he will certainly prove equal to the occasion. He has promised a short contribution for the Ag Student in the near future.

Prof. A. M. Paterson, '13, was judge of the sheep classes at the California State Fair during the first week of September.

Bovine Tuberculosis Eradication Makes Good Progress

E. H. Larson, '23

In 1910 the task of eradicating bovine tuberculosis in the United States seemed a stupendous one. Only the most visionary individuals dared hope for the completion of such an undertaking. The tedious subcutaneous or thermal test was the only one in use at that time. Since then, however, the ophthalmic and intra-dermal methods have been perfected, making it possible to clean up large areas in a few weeks with a relatively small force. The only feasible way to eradicate tuberculosis in the light of our present knowledge is to locate the diseased animals and properly dispose of them more rapidly than the disease can spread. The program of eradication has now assumed staggering proportions. The limiting factors at present are (1) veterinarians to do the work, and (2) the money with which to pay indemnities.

The number of cattle officially tested during June, 1922, was 250,886, a marked increase over corresponding figures for recent years. Of this number 8,810 reacted, thus disclosing about 3.5 percent of tuberculous cattle. Less than 1 percent of the cattle in the southwest reacted, while in certain localities in the north and east there were 15 to 25 percent that reacted.

The removal of such animals from herds otherwise healthy is gradually bringing about better health among farm livestock, safer milk supplies, and other economic benefits.

The popularity of tuberculosis eradication is evidenced by the length of the list of herds to be tested. This summer there were applications on file in offices of federal inspectors for the testing of 35,239 herds, containing more than half a million cattle.

Curious Carabaos of Orient Furnish Beef, Milk, and Draft Power

C. S. Lo, '23

Carabaos are found in all parts of China as far north as Shanghai. They are most common in regions where lowland rice is the main crop grown by the farmers. In these regions they are used chiefly as draft animals in the wet muddy fields. Carabaos have few sweat glands in the skin and for this reason cannot endure much hard work in the sun. The lack of sweat glands probably accounts for the desire of the carabaos to wallow in mud or water. If the animals work too long in the sun they are easily overcome by the heat, go crazy, and frequently have to be slaughtered.

The horns of the carabao are large and flattened. They are deeply grooved on the upper surface of the head and are usually curved. The length, measured in the outside curve of the horn, is a little more than two feet. The tail is short and reaches the hock. The skin is gray-black and very thinly covered with gray-black hairs.

The female carabaos, besides working in the rice fields, are also used for dairy purposes. Their milk is pure white in color and the butter made from it is also pure white. The milk is wholesome and palatable and a complete analysis shows approximately the following constituents:

Fat	12.46 percent
Ash	.89 percent
Protein	6.03 percent
Sugar	3.74 percent
Total solids	23.12 percent
Water	76.88 percent

The most common diseases of carabaos are rinderpest and tick fever. Tuberculosis is practically unknown to the carabaos of southern China. In the slaughter house of Hong Kong statistics show that for 13 years there were only two cases of tuberculosis in carabaos and both of them were bullocks.

THE KANSAS AGRICULTURAL STUDENT

KANSAS STATE AGRICULTURAL COLLEGE
MANHATTAN, KANSAS

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THE HOLIDAYS

The holidays! What a wallop in those two words! Vacation, home, family, friends! It is the season of joy and good tidings. Let us enjoy it all to the fullest extent and come back refreshed for the New Year.

A Merry Christmas and many of them!

ENDEAVORING NOT TO BE NARROW

The contributors to this issue of the Agricultural Student represent varous K. S. A. C. classes from 1909 to 1926. It is the desire of the publishers to enlist the cooperation of all present and former students, particularly those of the agricultural family, from the Sixties to the present freshman class. Occasionally we expect to have contributions from persons who have never been enrolled as regular resident students at this institution and from members of the college faculty, past and present. We have a broad field to cover and expect to have it attacked from various angles. We desire to mingle the enthusiasm of youth and the experience of maturity.

Our readers will note two interesting and valuable articles in this number contributed by members of our faculty who are alumni of other institutions. The writers are: H. B. Walker, Professor of Agricultural Engineering, a graduate in engineering from Iowa State College; and W. B. Balch, Cornell University, 1919, Instructor in Horticulture and florist and vegetable gardener of the Agricultural Experiment Station.

WHAT OTHERS SAY

Blushingly, we refer you to excerpts from a few letters of commendation received since the last issue of the Ag Student.

Dr. H. J. Waters, editor of the Weekly Kansas City Star: "I have read this number through carefully and find it to be the best agricultural publication from both a literary and mechanical standpoint of any that come to my desk."

Pres. W. M. Jardine, "The subjects are good and well chosen and the make-up is splendid. I am mighty proud of the publication and the bunch behind it."

Prof. H. W. Davis, head of the Department of English, comments as follows: "The Ag Student is high class in every respect. Such a publication is a credit to any institution."

H. W. Schmitz, director of vocational agriculture, Chase County High School, writes: "We receive The Kansas Agricultural Student and greatly enjoy the magazine. Several articles were used for special reports."

"ORIGIN OF THE NAME ALFALFA"

In the October number of "The Kansas Agricultural Student," we published an article, under the above title, by Frank W. Kerns. It should have been stated that the material in the article was compiled from Part II of United States Bureau of Plant Industry Bulletin 131, by Carl S. Scofield. We regret that proper credit was not given to the author of the bulletin referred to and we take this opportunity to make such amends as are possible under the circumstances.

When You Go Back to the Farm

H. A. Pennington, '09

EDITORIAL NOTE: Here is some valuable advice from an alumnus who has made a success of farming. Mr. Pennington, president of the Reno County Farm Bureau, is well qualified to give some real pointers.

First, let me say to those students of scientific agriculture who may read the following suggestions that I do not feel that my efforts here on the farm have been so successful that I have any special reason to regard myself as competent to advise students how to proceed upon their return to the farm. It is only upon the request of my friend, Dean Farrell, that I assume the role of adviser.

Mr. Pennington says:

"Go slow"
Do not plunge
Keep your mind open
Use your head
Keep your performance above the average

I believe that nothing has done more to bring discredit to scientific agriculture over our state, and I suppose throughout the United States, than the fact that many college students who return to the farm really fail to show that they can make good on the job. I realize that many of these men leave the farm and enter other lines of work simply because they feel that they will receive more in return for the amount of effort expended. But among those who are not acquainted with the facts, each of these men is cataloged as another college farmer who failed to make good. If, therefore, I should be fortunate enough to say anything that will help even one student to make good upon his return to the farm, I shall feel that my efforts are well repaid.

My first suggestion is: "Go slow." Let me explain just what I mean. Each one of you probably has his plan and a definite program he expects to carry out when he gets control of a farm. That is all right. You should have such a plan. But do not expect to put the whole program over in two, three, five, or even ten years. Another reason for going slowly is that only time and experience can teach you what and where the most valuable changes in your farm and farming operations will be.

I well remember that two years after the home farm had been turned over to me I wrote to Professor Dickens, saying: "When I came home I expected to have a model farm here in two years. Now that I have been at it two years I have set the time up to five years." Professor Dickens replied: "If you do it in ten years you will do well." Allow me to add that I have been at it twelve years and feel that I am still a long way from my goal.

But one should never lose sight of this ideal farm for which he is striving. Only be content to take what you have and gradually work it over to fit your ideal.

Second, do not spend all the money you have and all you can borrow to buy high-priced livestock and fine buildings. It is better to take good grade stock and by the use of good sires grade it up until you have learned the business. A little thought and a moderate sum of money usually will make snug quarters for this stock until such time as you are able to build more showy ones with the money you have *made*—not borrowed. Also by that time you will have a much better idea as to just what you will need and wish along this line.

The next thought that I would leave with you is this: Be willing to receive advice or keep your mind open. Just because you hold a degree in agriculture, do not go back to the farm believing that no one can tell you anything.

When the first county agricultural agent in Kansas was started to work in Leaven-

worth County, I remember reading that Doctor Waters, at that time president of Kansas State Agricultural College, called the agent into his office to give him some instructions. He said to him, "You are going into a county where nine-tenths of the farming is done about as well as it can be done. Keep this in mind and only try to help remedy the other tenth."

I think you will find that this fact holds true with successful farmers wherever you go. Their practices must be approximately correct or the farmers would not be successful. You will do well not only to listen to their advice concerning the practical side of farming, but even to go so far as to ask for it. To do this will help you over some of the rough places.

But in this matter of asking and using advice you will need to use your head. Do not rely entirely upon the advice of one man if you can have that of several who are successful. If the information you receive from several successful men all points in the same general direction, all is well. But frequently the advice you will receive from different persons will be contradictory, or not in keeping with your scientific training. Here is where you will have to use your head. Your county agricultural agent will also come in handy at this point.

In case the practical seems to be opposed to the scientific, it is wise to "go slow" until you find just how things stand. The principles you were taught at college may be all right, as a rule, but you sometimes have to deal with the exception rather than the rule. Allow me to illustrate, with an experience of my own, what I mean.

I happen to be farming in a rather sandy section where the land is very liable to blow if not handled with care. At the time I was in college the instructions were to follow the plow as closely as possible with the harrow in order to conserve moisture. One dry summer I began plowing wheat stubble early and instructed my man to unhitch from the plow every half day in time to harrow what he had just plowed. It looked fine, but my father insisted that the soil was likely to blow. I contended that it would not blow but would conserve moisture, and that the wheat would soon make growth enough to hold the soil. Later I took my father's advice and put in the rest of the crop as experience had taught him to do. The land which was harrowed directly behind the plow blew so badly that fall and winter that the wheat had to be listed up in the spring, while that which we allowed to dry enough to become a little cloddy before being harrowed, went through the winter in good shape.

My final suggestion is that you keep your farming above the average. While farming will have its ups and downs the same as any other business, I believe it will net the average farmer only a good living over a period of years. This rule of average holds true in most other lines of business as well as in farming. Very few college graduates will be satisfied with nothing more than a good living, and it is not to be expected that they should be. So the thing to do is to keep your business above the average.

By applying your training you should be able to increase the soil fertiity to a point sufficiently above the average so that it will produce crops above the average, which, when fed to better than average livestock in rations balanced better than the average, should net you a profit well above the average. If farming pays a good living to the average farmer, you will have your living too and an extra income to show for profit.

In closing I wish to say that it seems to me that successful farming does not consist of a few large things done in a spectacular way, but rather of an endless number of small, sometimes tedious, details properly attended to at the right time.

Prof. R. L. Hensel, since August, 1919, Associate Professor of Pasture Management in Kansas State Agricultural College, resigned his position October 15 to engage in business with his father. His present address is 1014 North Cherry Street, San Antonio, Tex.

Dr. C. W. McCampbell, head of the Department of Animal Husbandry, will address the Minnesota Livestock Breeders' Association at University Farm, St. Paul, Minn., January 5, 1923, on "Some Beef Cattle Production Problems."

Twenty teams competed for honors in the inter-collegiate stock judging contest, held at the International Livestock Exposition, December 2. The ranking of the five highest teams was as follows: Iowa, first; Purdue (Indiana), second; Kansas, third; Nebraska, fourth; and Texas, fifth.

Grand Champions Are Developing in the College Belgian Stud

L. M. Knight, '23

A GROUP OF CHAMPIONS FROM THE COLLEGE BELGIAN STUD

The Belgian stud owned by the college is kept primarily for the purpose of class instruction and promotion of the wider use of better draft horses. Exhibiting these animals at the outstanding livestock shows is an important factor in accomplishing these purposes. The mares making up this stud are all big roomy matrons, combining in the highest degree, type, massiveness, and quality. The two sires, Colgo and Farsar, are outstanding individuals of champion caliber.

In 1919 the Department of Animal Husbandry sent two mares to Mr. C. G. Good of Ogden, Iowa, to be bred to Farceur, America's greatest Belgian stallion of all times. The mating of these two mares, Grace and Helen, to Farceur, resulted in two stallion foals, one of which, Farsar, heads the college stud today. This breeding enterprise was so successful that in the summer of 1920 four mares were sent to Ogden, Iowa, for breeding, three to Farceur and a fourth to Jupiter. The mare sent to breed to Jupiter was a short, low-set mare, Jupiter being selected because he was a horse of more stretch and it was thought he would nick better than Farceur with the low-set mare. Four foals, three fillies and one stallion, were produced from these matings and all are maturing into splendid large stretchy horses. In fact, at the present time the college has a group of young Belgians that cannot be outclassed.

To Tom Greer, the herdsman, is due much of the credit for the success of the college horses. He studies their habits and characteristics and is able to tell the instant a horse becomes sick. Never has a sick animal gone through the night alone, as Tom is always on the job, night or day, to see that all possible help is given them.

The above picture is the likeness of five of the college Belgians. From left to right they are: Farzelle, Farceur's Lady, Mirzelle, Colgo, and Farsar. Colgo and Mirzelle were sired by Collart, a stallion imported from Belgium just a few months before the beginning of the World War. The other three are sired by Farceur, a horse that sold for $47,500, the

highest price ever paid for a Belgian sire. Farsar and Farceur's Lady are full brother and sister, having Grace for their dam. Elaine is the dam of Colgo and Mirza de Bou is the dam of Farzelle and Mirzelle.

The show record of these Belgians is remarkable. Colgo was Champion Belgian stallion at both the Kansas Free Fair and the Kansas State Fair in 1920. Mirzelle was Champion Belgian mare at Kansas Free Fair in 1920. Farzelle was Grand Champion Belgian mare at the Kansas Free Fair, Topeka, Kansas State Fair, Hutchinson, and the American Royal Livestock Show, Kansas City, 1922. Farceur's Lady stood second to Farzelle at each of these shows. Farsar was Senior and Grand Champion Belgian stallion at the 1922 American Royal, the only show in which he has ever been exhibited.

Perilous Field Bindweed Presents Difficult Eradication Problem

W. E. Stone, '23

The field bindweed, **Convolvulus arvensis,** is the most dangerous weed known to Kansas agriculture. Under favorable conditions a few specimens of this menacing plant will infest an entire farm in 10 or 15 years. The value of rich agricultural land infested with bindweed decreases to almost nothing. Recent experimental work on bindweed eradication has been conducted by R. E. Getty, Assistant Agrostologist at the Fort Hays Experiment Station. According to Mr. Getty there is no easy way to eradicate bindweed for any effective measure involves much expense or continuous labor for long periods of time.

Field bindweed spreads chiefly by means of its long creeping cord-like roots which at any part of their length may bud new plants. The stems are smooth, slender, slightly angled, and from 1 to 8 feet in length. They turn about or over any plant within reach and rob it of air and light while the roots below are robbing it of food and moisture. The leaves are alternate and halberb-shaped, with backward pointing lobes at the base. The flowers vary from pink to nearly white, are funnel-shaped, and about 1 inch across. There are usually but one or two flowers on each slender peduncle.

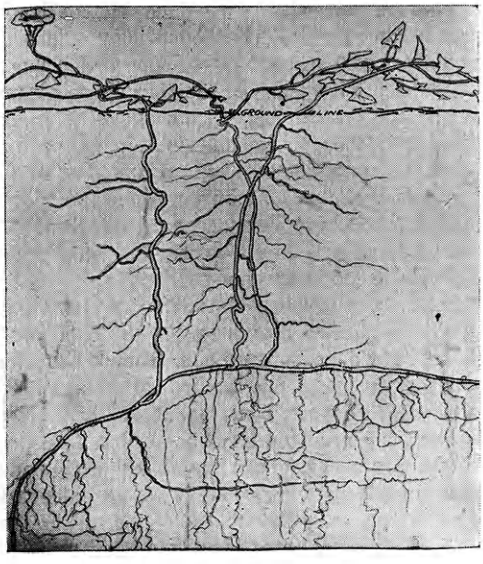
Three general methods of eradication have been tried at the Fort Hays station; namely, (1) livestock pasturing, (2) the use of chemicals, and (3) agronomic treatments. For the pasturing test sheep were used. Although they kept the bindweed area grazed closely this persistent weed retained its vitality. The sheep lost weight during the entire period.

The use of salt was proved to be impractical, except in very limited areas, due to the fact that it took 20 tons to the acre to kill the bindweed and ruined the land for crops. Spraying with various chemicals was effective in killing the bindweed but the expense of applying the numerous sprays eliminated it as a satisfactory control measure.

The agronomic experiments proved that 85 to 99 percent of the bindweed could be eradicated by either continuous fallow, continuous sorghum, or sorghum and fallow in rotation.

One of the fundamentals of bindweed control is to prevent it from starting in new areas. Pieces of bindweed roots, which will grow wherever they are dropped, are easily carried on vehicles and farm implements. Thrashing machines are excellent means of

(Continued on page 56.)



FIELD BINDWEED—A typical leaf, flower, and stem, as well as the general growth above ground, may be observed; also the underground root system which makes eradication so difficult.

Paterson Offers Some Practical Pointers on Lamb Feeding

E. A. Hepler, '23

An increasing interest in the matter of feeding lambs for market in many sections of Kansas and surrounding states has prompted many questions relative to the substitutive values of various feeds. The Kansas Agricultural Experiment Station has conducted several major lamb-feeding tests during the past eight years in order to secure some reliable data on the subject. A manuscript has been prepared for publication by Prof. A. M. Paterson, in charge of the investigations, giving the results in full. Excerpts from the most striking of these results are given in the following paragraphs.

One experiment was conducted to determine whether whole barley could be satisfactorily substituted for shelled corn as the grain portion of the ration in fattening lambs for market. The results show that the lambs receiving shelled corn made a slightly larger average daily gain and sold for a bit more per pound. Moreover, 100 pounds of gain was produced with 8 percent less shelled corn than whole barley. However, the difference in results between these two feeds was so small that where barley is a more certain crop or can be bought for 10 percent less than shelled corn, it may prove to be the more satisfactory feed.

The object of another experiment was to find the relative value of kafir, both whole and ground, as a substitute for shelled corn in fattening lambs. The first year only good-quality lambs were used in this experiment. The results indicated that shelled corn produced slightly greater daily gains than either whole or ground kafir. Ground kafir produced slightly greater daily gains than whole kafir, though the difference was too small to pay for grinding the kafir. It required approximately 12 percent less corn than either whole or ground kafir to produce 100 pounds gain. The spread between the selling price of the corn-fed and the kafir-fed lambs was extremely narrow. The second year a test was conducted with lambs of only ordinary quality and the results were practically the same as the first year, with the exception that the lambs fed whole kafir gained as rapidly and sold for as much per pound as did the lambs fed shelled corn. In this particular test ground kafir heads were fed instead of the ground threshed grain which was used

CHAMPION SHROPSHIRE RAM, 1921

the previous year. The lambs receiving the ground kafir heads did not make as rapid daily gains as the lambs fed shelled corn or whole kafir grain, but they sold for almost as much per pound, indicating a satisfactory finish. When the total amount of ground kafir heads was reduced to the actual amount of grain required to make 100 pounds gain, it was found that the grain actually consumed was as efficient in producing gains as the threshed grain, since the lambs fed ground kafir heads did not eat quite as much actual grain and their daily gains were not quite as great.

The results of these two tests indicate the practicability of utilizing kafir, either ground or unground, where it is available, as a grain ration for fattening lambs.

Another experiment was conducted to determine whether lambs can be fattened as economically by the use of a self-feeder as by hand. It was found that self-fed lambs ate excessive amounts of linseed oilmeal and

required a greater amount of feed to produce 100 pounds gain than hand-fed lambs.

A fourth experiment with fattening lambs was for the purpose of determining the relative value of a rich protein supplement. Three lots of lambs were used for this experiment, each of which received shelled corn, alfalfa hay, and silage. The lot receiving linseed oilmeal as a protein supplement made an average daily gain of 0.4 of a pound per day as compared to 0.34 of a pound per day for the lot receiving cottonseed meal, and only 0.28 of a pound per day for the lot receiving no protein supplement. Each 100 pounds gain in the lot fed linseed oilmeal cost $15.02; in the lot fed cottonseed meal, $17.56; and in the lot fed no protein supplement, $19.44. These results show very strikingly the value of adding a rich protein supplement to a ration used in fattening lambs for market.

The results of an experiment conducted to determine the relative value of sweet clover and alfalfa hay indicate that sweet clover is a very satisfactory substitute for alfalfa hay in a ration for fattening lambs. Sweet clover hay, therefore, may be used to good advantage in many localities where alfalfa cannot be grown.

Significance of Sorghum Improvement to Kansas Agriculture

(Concluded from page 36.)

plant selection. Dwarf forms have occurred in most varieties and have furnished material for the production of many of our improved varieties and strains. Several dwarf strains of kafir, milo, and feterita have been developed by this method.

Selection is the most important method which the farmer can use in improving sorghum varieties. If he already has an adapted, fairly pure variety he may well continue growing it. If not, he should obtain seed of a variety recommended by the Kansas Agricultural Experiment Station for his locality. Such seed may usually be obtained through the Kansas Crop Improvement Association. Heads for seed should be selected before frost, or soon after the first frost, and should be mature, free from the boot, and from a desirable plant as to height and other characters. All heads selected should be of a uniform type as to size, shape, color of glumes and seed. This kind of selection is known as mass field selection.

The combined use of mass selection and individual plant selection has proved a very satisfactory method and enables farmers to get good seed in a short time. The first year selected heads are planted in individual rows. The second year seed of the heaviest yielding heads are used in a performance test in an isolated plot where the dangers of natural crossing are lessened. All off-type heads are rogued out as soon as they appear to prevent mixtures and crossing. The seed from the test plot should be used to plant the general crop, which if saved for seed should be carefully rogued at heading time. It is possible to secure a higher-yielding strain and also to isolate many other desirable characters by this method.

Until the last few years very little breeding work was done with the sorghums. Two crosses are being studied at the Kansas Agricultural Experiment Station—Red Amber X feterita and Kansas Orange X Dwarf Yellow milo. The object of the Red Amber X feterita cross is to get a variety of sorghum which will give a high yield and good quality of both grain and forage. At present most of our grain sorghums do not produce a good quality or a high yield of forage. Red Amber has a high forage yield, a juicy stalk, seed covered by glumes, and a fine leafy stem. Feterita has a high grain yield, soft white seed, a dwarf stature, a marked resistance to both head and kernel smuts, and matures early. The cross has been grown through the sixth generation. A few types have been found with the desired combination of characters, but they must be tested further as to their yielding capacity, adaptation, and value for forage and grain as compared with the parental varieties.

The object of the Kansas Orange X Dwarf Yellow milo cross is to combine the best characters of the parents and to get a veriety which has chinch bug resistance and does not have the recurving which is so prevalent in milo. This recurving makes harvesting difficult. Kansas Orange has a high yield of forage, a juicy stalk, bitter seed, small hard kernel, and is late-maturing. Dwarf Yellow milo has a pithy stalk, few leaves, high yield of grain, and the seed shatters badly. Heads of Dwarf Yellow milo are often goosenecked and the crop is very often entirely destroyed by chinch bugs.

How the Entomologist Develops Control Measures That Save Millions

J. W. McColloch, '12

A few years ago a Kansas farmer, while harvesting his wheat, observed many fallen stalks of grain which the machine was passing over, and on investigation found them infested with flaxseed of the Hessian fly. Hoping to avert loss to the next crop of wheat, he wrote to the Department of Entomology asking that an investigator be sent out to study the situation and make recommendations for preventing a repetition of the injury. Instead of sending a man, the department wrote a letter, giving full details as to the behavior of the Hessian fly and stating just what steps to take for its control. The farmer was skeptical of such advice, believing that the conditions existing in his locality could not be known by a man in an office in Manhattan. This farmer is not an exception, for there are many who do not know the solid foundations upon which the recommendations of control measures for various insect pests are based.

The Department of Entomology of the Agricultural Experiment Station recognizes that the control of injurious insects is one of the essentials of successful agriculture. However, before an insect can be effectively controlled it is necessary that a thorough study be made of its life history and habits, for, after all, insect control is based on insect activities. There is a great difference in the development of different insects and it is obvious that control measures will also differ. A pest of wheat cannot be fought in the same manner as an apple pest. Neither can an underground insect be handled in the same manner as a leaf-eating insect.

The Department of Entomology, therefore, endeavors to study each insect under all conditions which it may encounter during its life. Three methods of procedure are employed in these studies in Kansas. First a careful field study of the insect is made in many localities over a period of years, noting every fact that is observed relative to its life history; its food plants; where, when, and how it hibernates; the effect of climatic, soil, or other environmental conditions; and the effect of cropping methods on it. Every observation, no matter how trivial, is recorded because it may have a significance in relation to other observations. Such studies, while they consider the insect en masse often lead to definite control measures. The fact that the adult chinch bug migrates to the clump-forming grasses, led to the development of the winter burning of such grass as the most effective method of control. The chance observation, made while driving along the road, of grasshoppers feeding on bits of orange peeling pointed the way to the discovery that poison bran mash with fruit juice was the most practical way of destroying this insect.

While the field study is of great importance it does not permit the careful observations of individual insects. It is often necessary that the exact period of the egg stage, the larval stage, the pupal stage, and the life cycle be determined. It is also essential to learn when egg deposition begins and ends, the number of eggs a female deposits, the amount of food required, and numerous other points which have a direct bearing on the life economy. Such studies can be made only when the insects are reared in individual cages under field conditions. A large screen insectary is therefore maintained, wherein conditions approximate those occuring in the field. This insectary is fully equipped with cages of various types adapted to the study of particular insects. It also has a complete set of meteorological instruments for checking the experiments with field conditions. Such studies give the exact length of the life cycle and the number of broods a year, which are important factors in many control measures.

Some insects are not easily studied in the field or in the field insectary, but require special methods. This is especially true of such insects as white grubs, wireworms, and false wireworms, which live under ground and feed on the roots of plants. As many of these insects require two or more years to complete their life cycle, a large cement cave

was constructed in which these particular insects are reared in small tin cages containing soil and food. In this way temperature, moisture, and soil conditions are regulated so as to approximate those occurring in the field. In this manner life histories of many injurious species are obtained.

It also often happens that a particular injurious insect does not occur about Manhattan, and in such cases it is necessary to establish field stations in the area where the insect abounds and to conduct the studies there. This has been done in many cases in Kansas, notably in regard to the maize bill bug and kafir ant, which are serious pests in the southern part of the state. A complete field insectary and laboratory was maintained at Winfield for two years, and the results thus secured enabled the development of definite control measures.

The third method of procedure is to study the insect under controlled conditions in order that the factors influencing the life of the insect may be determined. It is well known that insects are greatly influenced by various environmental factors. Why is the Hessian fly two-brooded one year and five-brooded the next? Why does it injure one variety of wheat more than another? Why does the chinch bug fungus appear one year and not another? These and numerous other questions can be answered only by the most careful experiments under known conditions. In order that such studies might be made, an air-conditioning machine was installed in the greenhouse in 1915. This machine regulates the air in two large rearing chambers so that a constant temperature and moisture can be maintained for long periods of time. Each chamber can be kept at a desired temperature and moisture and in this way optimum as well as fatal conditions can be ascertained for any insect. The food supply can also be regulated by growing the plants in water cultures of known concentration. Studies made under such conditions have produced many valuable results. It is now known what influences the number of broods of Hessian fly; why a few days of dry weather at certain times bring an outbreak to a close; why it is safe to plant wheat after a certain date; why the chinch bug fungus does not develop in certain years; and numerous other equally important points. In many cases it is now possible to predict insect outbreaks from a knowledge obtained by studies under known conditions.

As has been emphasized, the purpose of all these investigations is to develop methods of control. The results of the three lines of research are brought together, summarized, and analyzed. The vulnerable points in the life cycle are discovered and laboratory experiments are outlined in control measures. Two factors are always kept in mind in developing control measures: They must be (1) practical and (2) economical. If these laboratory methods prove successful, the work is carried to the field and given a thorough test. This may require several years of experimental work in many localities. The fly-free-date for controlling the Hessian fly was determined by actual experiments conducted on many farms throughout the wheat belt over a period of 10 years. When the experiments have progressed to a place where the results show that the insect can be controlled successfully, the information is given to the public.

Perilous Field Bindweed Presents Difficult Eradication Problems

(Concluded from page 52.)

dissemination. They should be thoroughly cleaned before thrashing any crop. Care should be taken to sow only pure crop seeds. Manure from animals fed upon crops contaminated with bindweed should not be used until properly composted for six months.

If bindweed has secured a tenacious hold on a farm agronomic methods of eradication can best be resorted to as the cheapest and most practical. On large areas of bindweed continuous fallow with a system of clean cultivation is a good practice. The ground is plowed in early spring and cultivated at frequent intervals with a sweep cultivator which cuts the roots at a depth of three inches. On smaller areas a disking program can be used with fair results but it is not as efficient or convenient as the sweep cultivator. Another good practice is to fallow with clean cultivation until July 1 and then plant to close drilled sorghum each year. In regions where it is well adapted alfalfa may be used as the smother crop.

Futurity Winners Produce Futurity Winners for First Time

Francis Houlton, '24

Every breeder is anxious to win the "futurity," because he is permitted to show only the hogs which he himself raises. This means that the place where the breeder's hogs stand in the futurity is in the minds of the public a measure of his standing as a hog breeder. In order to have a futurity class, 20 breeders or more must nominate one or several sows from their herds. This year at Topeka, 37 breeders made nominations.

In 1918, Dr. C. W. McCampbell, while visiting a swine breeder, saw a sow which he liked, so bought her. She farrowed a litter of pigs that looked promising. He figured out a ration for these pigs and had them fed accordingly. The litter progressed so well that it was entered in the futurity at the Kansas Free Fair, 1919, and won first and second on individual showings and first prize on litter.

In the fall of 1921 it was decided to fit the litter of the first prize futurity winner (1919) for the 1922 futurity show at the Kansas Free Fair. This litter was handled in practically the same manner as the prize winners of 1919. The pigs developed very rapidly, as is shown by the fact that the day they were driven into the show ring they were 12 months old and averaged 500 pounds in weight.

This litter (see illustration) won first and second prizes as individuals and first prize as a futurity litter, winning the same as the litter of 1919, of which the dam was a member. This is the first time that a futurity winner at the Kansas Free Fair has produced a prize-winning litter. These winnings show that K. S. A. C. is producing the right kind of pigs, and they are "breeding on."

Of course feeding has had something to do with the success attained by these pigs in the show ring. Since both litters were farrowed in the fall, the ordinary pasture available in the summer time could not be used, and it was necessary to provide a rye pasture for them from the time they were weaned until alfalfa was available in the spring. These pigs had access at all times to a self-feeder containing shorts in one compartment, and tankage in another. Both litters were fed twice daily a slop consisting of shorts, linseed oilmeal, and milk. No corn was fed until the last 30 days before showing.

PRIZE-WINNING FUTURITY LITTER—KANSAS FREE FAIR, 1922
The dam of these Poland China gilts was a first prize futurity winner in 1919. The Poland Chinas of the college herd are "breeding on."

Recent Feeding Experiment Tallies Another Point for Silage

G. C. Bartgis, '24

That it is normally more economical to winter steers on silage and cottonseed meal than on alfalfa hay has been demonstrated by a feeding experiment recently completed by the Department of Animal Husbandry.

The object of this experiment, which was started in 1919 and lasted 865 days, was to ascertain which was the more economical winter feed for steers, alfalfa alone or silage with a limited amount of cottonseed meal as a protein supplement.

The results showed that during the winters of 1919-20, 1920-21, and 1921-22 the silage-fed steers consumed a total of 500 pounds of cottonseed meal and 14,486 pounds of silage per head, while those steers receiving alfalfa alone ate 8,338 pounds per head during the three winters. In the summers all the animals were allowed to run together in the same pasture.

The silage-fed steers made an average gain of 0.8 of a pound per day for the entire period and the alfalfa-fed steers an average gain of 0.83 of a pound per day. The steers wintered on silage with the protein supplement made gains 2 percent less than the steers wintered on alfalfa hay.

Bell's Melrose Qualified to Fashion History for Ayrshire Herd

Walter J. Daly, '25

Melrose Good Gift, present head of the Ayrshire herd at the college is getting old. He has many times, however, proved himself a sire of outstanding merit in the transmission of high production to his progeny. Bell's Melrose is the young sire, bred by John Linn and Sons on their Ayrshire farm near Manhattan, that is to succeed Melrose Good Gift as head of the college Ayrshire herd.

A glance at the pedigree of Bell's Melrose proves that he is an individual in which is concentrated the blood that has made for production in Ayrshire history. His sire is Elizabeth's Good Gift, a bull that has many high-producing daughters in the herd of John Linn and Sons. Five of these daughters are in the advanced register and have made seven records which average 10,001 pounds of milk and 355.83 pounds of butterfat. All these records with the exception of one were made by two-year-old heifers. One of his daughters, Linndale Prosperity, was Grand Champion female at the Kansas State Fair in 1919. She also holds the state junior three-year-old record for the breed with 12,725 pounds of milk and 467.82 pounds of butterfat.

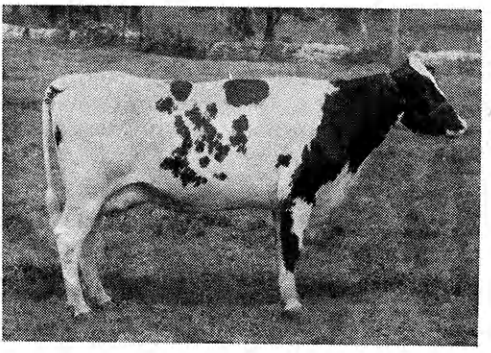
The grandsire of Bell's Melrose on the paternal side is Melrose Good Gift, a sire that has done much in the establishment of Ayrshire popularity in Kansas. His 14 tested daughters have 26 records which average 10,947 pounds of milk and 418.7 pounds of butterfat. This production is an average increase of 2,116 pounds of milk and 80.61 pounds of butterfat over that of their dams at corresponding ages. Melrose Good Gift is also the sire of a world's record daughter in the Roll of Honor, and two French cup winners.

The granddam of Bell's Melrose on the paternal side is Elizabeth of Juneau, a former world's record cow. His dam was Bell's Bell who died without completing a yearly record although she qualified for advanced registry in 214 days and has a daughter, Bell's Bell 2d, having three records which average 11,524 pounds of milk and 494.76 pounds of butterfat.

As grandsire on the maternal side, Bell's Melrose has Albert Cook, one of the greatest sires of the breed. His seven tested daugh-

ters have 20 records which average 11,700 pounds of milk and 446.93 pounds of butterfat. He sired Canary Bell, a College-owned cow that is now the Kansas champion of the breed.

From ancestry such as this a sire of great producing daughters is anticipated. This is exactly what Bell's Melrose is proving himself to be. His first daughter on test, B. M.'s Bangora Melrose, has just finished a record of about 16,140 pounds of milk and 616 pounds of butterfat in the junior two-year-old class. Her dam, Bangora's Melrose 2d, is a full sister of Bangora's Melrose, who won a French cup as a junior three-year-old. The record which B. M.'s Bangora Melrose has just finished will exceed the production of her dam at the same age by about 200 pounds of butterfat. Additional proof that Bell's Melrose is capable of transmitting to his progeny the high-producing blood which he carries is forecasted by several of his other daughters. One of these promising heifers, the daughter of Melrose Canary Bell 2d, former world's record junior two-year-old, will freshen about December 20. A great deal of interest is being manifested in the result of this combination of high-producing blood lines.



B. M.'S BANGORA MELROSE—The first daughter of Bell's Melrose on test. Her production record shows a fine increase over that made by her dam at the same age.

Applying the Science of Engineering to Agriculture

H. B. Walker

The farmer of today who is proficient in the fundamentals of his business is a man of no small ability. He is comparable and equal to the very best citizens of our land, is alert and anxious to apply science to every farm practice, and eager to install modern appliances for the improvement of his home and community. His station in life reguires a comfortable and modern home; he must have social and educational advantages for his family; and the economic conditions surrounding his vocation require that he utilize intelligently the many labor-saving devices available for his farm operations.

The mechanics of farming is a matter of great importance to the farmer's success. In fact this part of agriculture has developed to such an extent within recent years that it is now common to speak of the engineering of agriculture. A number of state institutions, including Kansas State Agricultural College, have inaugurated special engineering courses to train men for service in the field of agricultural engineering. (This emphasizes the rapidly growing importance of agriculture since it now includes engineering as an important related science in its development.) But if engineering is to be utilized to its fullest extent, the farmer must have a full appreciation of the application of this science to his business. A century ago it took four farming families to maintain one family living in town. Today one farmer, through the use of labor-saving machinery, is supporting four families in town. Seventy-five years ago practically all of the threshing of grain was done with a flail. Today a farmer could not thresh enough grain in this manner to provide his family with the bare necessities of life.

Farming at the present time is carried on with small margins of profit and a relatively great volume of business. The capital invested is likewise large. To compete successfully in this basic industry a proper appreciation of the application of time and energy to farming details is essential. That the Kansas farmer is alert to this situation

is indicated by the returns of the recent United States census. During the 10-year period from 1910 to 1920 the value of farm implements and machinery increased 220.3 per cent, although the number of farms during this same period decreased 7.1 per cent. This indicates that Kansas farmers are adopting labor-saving equipment and no doubt they are using this with profit. However, when investments in machinery and labor-saving devices are increasing so rapidly, it means that the farmer must devote a relatively greater amount of thought and attention to the selection, care, and utilization of this equipment. Machinery is now a material factor in farm profits. A better understanding of its use means greater profits to the farmer and more satisfaction in its operation. The successful farmer of today must study his machinery as well as his soil, crops, and livestock.

Closely related to the economic use of farm equipment is the problem of soil improvement through engineering methods. The large modern farm machinery units of the west, whether horse or mechanically operated, require large uniform fields for economical operation. To bring about these conditions the farmer is frequently confronted with problems of soil improvement by means of land clearing, terracing, ditching, or tile drainage. It is not reasonable to expect that he must be proficient in all of these things, but it is important that he should understand the principles involved in order that he may utilize with profit the engineering skill he employs to lay out and supervise such construction when necessary.

Kansas farmers, in 1920, had more money invested in farm buildings than in their livestock. This does not mean that farm buildings are relatively more important than livestock, but it does convey an idea of the volume of capital involved. Comfortable, convenient, and attractive farm buildings are a great asset in agricultural development. Generally speaking, rural residents are living in homes which do not compare favorably with city homes. This, no doubt, is a contributing factor to the tendency for retirement to the city by farmers who have made a competence from the soil. Convenient farm homes are just as essential for the country farm as for the city home. The significant point, however, in securing modern conveniences in the country is that the rural resident must do a lot of his own planning and construction while the city dweller may leave these details to mechanics. Because of these conditions, it is desirable that the farmer should have a practical knowledge of building design and construction. This should include sanitation and water supply, heating, ventilation, and lighting. Some fundamental knowledge of these matters will be of great benefit in the planning of the farmstead, and, when intelligently applied, will bring about the construction of more convenient, comfortable, and attractive farm buildings.

Because of the nature of his business the farmer must, to a large extent, be his own mechanic. Shop work on the well-managed farm is an economic necessity. The farmer who knows how to use tools effectively can do a large percent of his own repair work with a great saving of both time and money. A useful knowledge of blacksmithing, carpentry, rope work, belt lacing, soldering, and babbiting is a great asset.

These are a few of the many sides of the farmer which must be developed. If the young man who is interested in agriculture is fortunate enough to receive the advantages of high school and college training he should not overlook an opportunity to secure at least some fundamental training in engineering as it applies to the science of agriculture.

Show Ring Record of Her Foals Places V. Laura in the Limelight

(Concluded from page 41.)

later made Junior and Grand Champion mare of the show. In the Kansas and Missouri specials Alline was made Junior and Grand Champion.

In 1922 V. Laura produced the stallion foal, Jungo, sired by Reinhard 84852. Jungo was shown as a weanling stallion this fall and won in his class at Topeka, Hutchinson, and the American Royal.

V. Laura is a mare highly prized by the college because of her reproducing ability and the show ring record of her progeny.

Alumni Notes

Fred Carp, '18, of Wichita, visited college Homecoming Day.

D. L. Deniston, '21, is teaching high school agriculture at Louisburg.

George Hinds, '21, is director of vocational agriculture in the high school at Castle Rock, Colo.

J. Farr Brown, '21, is located at Jetmore as County Agricultural Agent of Hodgeman County.

Deal Six, '22, is teaching agriculture in Carbondale Rural High School in Osage County.

R. S. Mather, '22, is working in the Kansas State Grain Inspection Department at Kansas City, Kan.

D. L. Signor, '21, is director of vocational agriculture in the Byers Rural High School in Pratt County.

John M. Moore, '22, member of the dairy judging team of 1921-22 is assistant milk inspector at Topeka.

L. R. Hiatt, '17, is located at 131 West Sixth Avenue, Topeka. He is engaged in the insurance business.

O. T. Bonnett, '18, is director of vocational agriculture in the Alton Rural High School in Osborne County.

Sam J. Smith, '20, has headquarters at Hutchinson. He is County Agricultural Agent of Reno County.

A. E. Cook, '21, is director of vocational agriculture in the McDonald Rural High School in Rawlins County.

A. E. Lawson, '16, is the western representative of the American Shorthorn Breeders' Association with headquarters at 205 Exchange National Bank Building, Spokane, Wash.

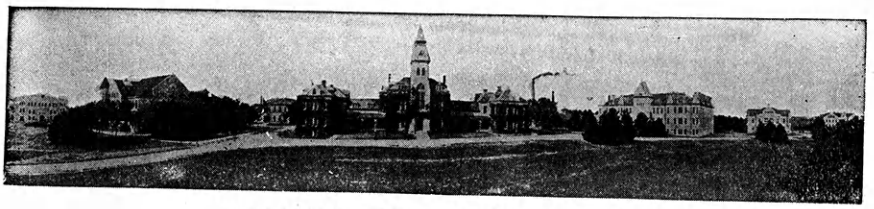
W. R. Horlacher, B. S. '20, M. S. '22, was recently appointed instructor in animal husbandry. He will assist in the cattle experimental work and teach animal husbandry courses.

J. L. Lantow, '17, is assistant professor in animal husbandry in New Mexico State College of Agriculture at State College, New Mex. He stopped at the college a day on his way to the Royal.

S. Lynn Copeland, '22, who majored in Dairy Husbandry and was a member of the dairy judging team of 1921-22, is taking graduate work in the South Dakota Agricultural College at Brookings.

A. F. Swanson, '19, in charge of Cereal Investigations at the Fort Hays Experiment Station, has been granted a year's leave of absence during which time he will do graduate work in the University of Minnesota.

George M. Drumm, '21, who majored in Dairy Husbandry and took his master's degree at Iowa State College in the spring of 1922, is now herdsman for the dairy herd of the University of California, Davis, Calif.



A COLLEGE THAT SERVES A STATE

Winter Care of House Plants

(Continued from page 39.)

not quite so dry, while in a house heated by hot air the humidity is still higher. In any case, however, a room heated by artificial heat is drier than it normally is out-of-doors. Under such conditions water added to the soil evaporates very quickly so that only a part of that added is available for plant use. The plant also uses water in dry, hot weather in keeping its "body" temperature down. Thus an insufficient supply of water causes plants to wilt down slowly but surely.

Wilting is avoided by increasing the amount of moisture in the air. It is not necessary to keep the plant roots in water or to soak the soil continuously. Some plants like a moist soil while others do better in a comparatively dry soil. This point must be learned from observation or study. To keep the air damp nothing has been found which equals a pan of water set on or near the stove, register, or radiator. The water in the pan is evaporated and distributed through the air reducing the transpiration from the plants. Spraying the leaves with water, every clear day, also increases the moisture content and acts as a general tonic to the plant. Watering the plants two or three times a day is not a good practice.

Plants in pots require more water than those in boxes as a large amount of water is lost by the evaporation through the pot. This is an advantage rather than a disadvantage, for air also passes through the pot, if it is unglazed, and is of benefit to the roots. Plants in small pots require more water than those in large pots. In the resting stage plants require less water than when they are growing actively. A good general rule to follow is to watch the soil at the top of the pot. When it is thoroughly dried out water the plant. When watering add enough to saturate the entire mass of soil. Do not just wet the top and trust to luck that the soil in the bottom will get wet enough. One can usually be assured that the entire mass of soil is soaked when water runs out of the bottom of the pot.

In addition to the usual method of watering pots, that is, pouring water on the top until it runs out at the bottom, there is a more positive way of watering. In this method pots and boxes are set in shallow water. The water will soak through the sides and bottom until it has reached its own level. Then, by capillary attraction it will be drawn up in the soil until it reaches the top. When the top is evenly moistened one can be assured that the entire mass of soil is saturated. On removing the pot from the water the excess water will drain off and the soil needs no more attention until the plant shows signs of dryness.

All plants require some light. Sunlight supplies the energy which causes chemical reactions to take place inside the leaves. These reactions convert the raw food elements into food elements available to the plant. Therefore such sun-loving plants as geraniums, roses, and abutilon, when set away in a dark corner, do not thrive so well as when placed in a sunny window. On the other hand plants which like a mild amount of sunlight, and this includes palms, aspidistra, ferns, and many of the vines, do not thrive if put in a sunny location.

West windows are to be avoided whenever it is possible. The afternoon sun is too strong for plants and it does not seem to act favorably on even the most sun-loving plants. If a west window must be used some sort of a protection should be given the plants to reduce the amount of light and heat.

Fertilizers of any kind should be added only in small quantities and only to healthy growing plants. More harm is done to house plants by overfertilization than any other single agency. Fertilizer is plant food and as such is very rich. It must not, therefore, be given in large quantities nor to sickly plants. If a plant has been growing thriftily for some time and then begins to go back it probably needs a rest and no amount of forcing will do any permanent good. It will in fact do a definite harm. During the resting period a plant is better if left entirely alone in a dry cool cellar. It will of its own accord and without any attention of any kind, begin to put out new green shoots. When these new shoots show themselves the plant should be given a thorough watering, a repotting if necessary, and brought up into its place in the sun. After it is growing well it may be given fertilizer.

The best fertilizer is liquid manure. A mixture of half straw and half manure is soaked in water about 24 hours. Water

should be used at the rate of 2 gallons for each pound of the mixture. The solution is then poured on the soil. Sodium nitrate is less disagreeable to use and nearly as effective. It should be applied at the rate of 1 teaspoonful to 1 gallon of water. Care must be taken that none of the fertilizer touches the leaves or stems of the plants. It should be added immediately after the plants have been well watered and not used more than once in two weeks.

Without good soil no one can grow good plants. The idea, however, that each genus must have a different soil is erroneous. Plants can and do adapt themselves to varying soil conditions provided only the necessary soil elements are present in sufficient quantities.

A soil that practically all plants can adapt themselves to is one containing leaf mould, garden loam, and clean gritty sand. Leaf mould furnishes the food elements in a form quickly available to the plants. When leaf mould is not available well rotted barnyard manure is a very good substitute. Garden loam is a broad term used to describe a soil which contains some clay, some grass roots, and usually a little slowly available plant food. If there is none nearby, decayed pasture or lawn sod may be used. Sand has no food value but tends to prevent packing and caking of the soil and helps in the drainage. Good drainage is as necessary as soil or water for by draining off the excess water air is allowed to enter the soil.

There is no substitute for sand, which should constitute about one-third of the volume of the entire mixture. The other two constituents of the mixture vary somewhat with the roots of the plant to be potted. Plants with large, coarse roots require less of the manure or leaf mould than those with finer roots. Young plants require less of the richer food-bearing soil than older ones. In every case the soil must be freed of lumps, stones, small sticks, and pieces of straw. This is best done by removing the sticks and pulverizing the soil. Sifting through a fine sieve is not advised. When the soil has been prepared as recommended a tablespoonful of bone meal mixed into a bushel of dirt is often of general benefit.

Insects are not very troublesome to house plants. If any appear they can be disposed of if the proper steps are taken immediately.

Insects are grouped into two classes: (1) Those which eat parts of the plant and (2) those which secure their food by sucking out the plant sap. Those which actually eat parts of the plant are known as chewing insects and are best destroyed by picking them off the plants. They may also be destroyed with a spray of arsenate of lead. The arsenate is added to water at the rate of 1 tablespoonful to 1 gallon of water. Sucking insects may be destroyed by dipping the plant in oil emulsion or a proprietary tobacco extract. This material may be sprayed on the plants but the dipping process is more satisfactory. Nicotine sulphate is the best of the sprays for sucking insects. A teaspoonful to a gallon of water will destroy the insects if it comes in direct contact with them.

The growing of plants requires care, time, and observation. With the growing of indoor plants this is especially important for even the best house conditions are not the most favorable for plants. Good-looking specimens can not be produced without careful attention and nothing looks worse than a bunch of poor sickly plants.

Those who have porch plants in the summer time and can not care for them in the winter should prune them quite severely, place them in a cool dry cellar, and forget about them until early spring. In the spring a little water, possibly a repotting, and regular attention will give them a good start.

E. L. Barrier, a member of the State Board of Administration, who raises pure-bred Duroc Jersey hogs and Angus cattle, recently donated a Duroc Jersey boar and an Angus bull to the college.

J. W. Stockebrand, '15, is director of vocational agriculture in the high school at Rocky Ford, Colo. His judging team won the state high school championship of Colorado and a trip to the International where they were entered in the interstate high school judging contest, December 1.

POWER—The Mainspring of Farming

IF there be any doubt in your mind that power is the controlling factor in agricultural progress, glance for a moment at history.

Through all the centuries up to the nineteenth, there was little or no progress in agriculture, because there was no power available except human muscle assisted occasionally by animal power.

The nineteenth century brought improved machinery, operated by animal power, and agriculture progressed farther than in all the ages before. But animal power, alone, also has too many limitations.

Today mechanical power is taking up the heavier burdens, again speeding up farm work and giving the farmer better control of weather, crop and soil conditions. Thousands of farmers are already testing out this new power, proving to their own satisfaction that it removes more of the obstacles from the path of agricultural progress.

Our job, and yours, is to see that the good work goes on. We shall continue to supply efficient power farming machinery. You will see that farmers learn to use it to the best advantage. The better the power, the better the farming and the more sure the farmer's profits.

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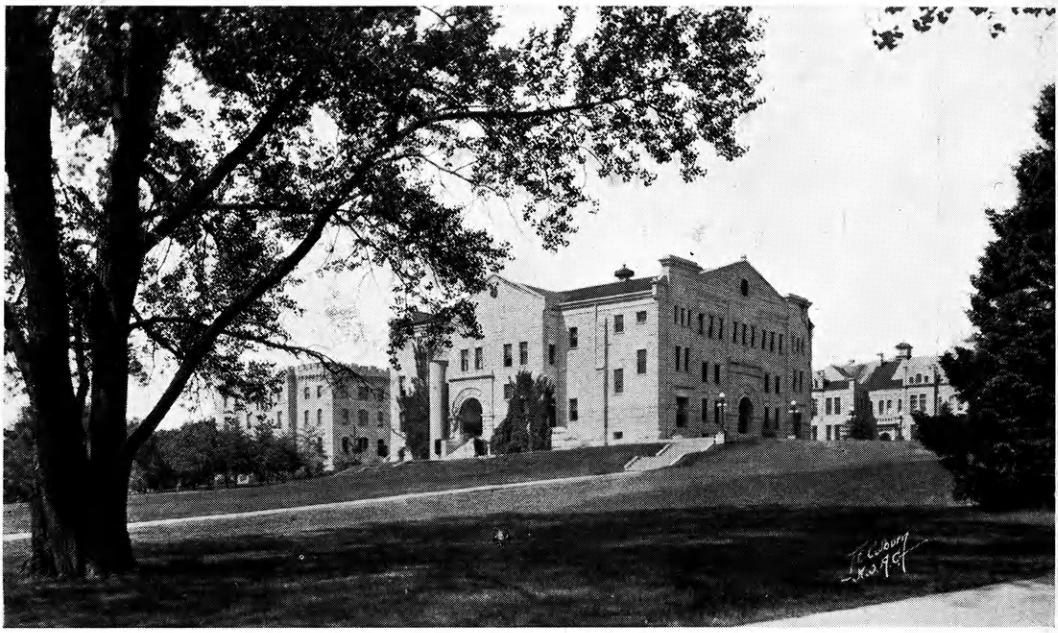

A VIEW ON THE CAMPUS

EDUCATION AND ENVIRONMENT

The kind of education you get is influenced profoundly by your environment; by the atmosphere of the place in which you live, study, work and play.

You cannot reasonably expect to get the best in education at a place which lacks inspiration and educational stimulus.

It is a great advantage, educationally, to attend a school which has an atmosphere that promotes vigorous educational development; the kind of atmosphere that prevails at

KANSAS STATE AGRICULTURAL COLLEGE

With its beautiful campus and commodious buildings, its well equipped laboratories and workshops, its farms, gardens, and orchards, and its capable faculty and vigorous middle-western student body, it has an inspiring and democratic atmosphere of good service, scholarship, hard work, and wholesome play.

The instruction offered to agricultural students is an admirable balance of practical courses in the fundamental sciences and in English, Agricultural Economics, Agronomy, Animal Husbandry, Dairy Husbandry, Horticulture, Milling Industry and Poultry Husbandry.

This instruction is supplemented by practice and study in music, debate, public speaking, athletics and other desirable activities.

Liberal opportunities are offered for choosing elective courses.

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