

# *Kentucky* FARM AND HOME *Science*

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Number 1

Winter 1958

READ—

Blueberries

Animal  
Nutrition

Greenhouse  
Tomatoes

Short Reports



# Kentucky FARM AND HOME Science

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## *The Cover*



These persons comprise a taste panel that has been operating at regular intervals during the past several months in the School of Home Economics. Strawberries, preserved and frozen, from plants which were treated with more than 20 insecticide combinations are being evaluated for flavor. The trained panel of judges are from the departments of Entomology and Botany, Feed and Fertilizer, and Horticulture, and from the School of Home Economics. The method used is the triangular system by which two like samples are selected from three unknowns. Purpose of the partitions is to insure objective reactions.

**Diversification of fruits needed;  
horticulturists study ways  
that may make possible**

## Blueberries for Kentucky

By **CARL E. CHAPLIN**

More diversification of fruit crops is needed in Kentucky.

The blueberry, a delicious fruit but one not known to many people here, shows promise as a new fruit to add to the list of those grown in the state. Provided it could be profitably produced, there should be a ready market. The price is always good, and since Kentucky blueberries would mature a month to 6 weeks before those in Michigan they should command a premium price.

Under optimum conditions, the plants require a highly organic soil with a pH of 4.5 to 5.0. Such a soil would be considered as being strongly acid. Some Kentucky soils have the proper acidity, but they are mineral soils low in organic matter. Also, at certain times of the year their moisture supply is likely to be inadequate, and it is necessary that soils in which blueberries grow have a rather constant water table of about 18 inches.

The problem, therefore, is to overcome the effect of the low organic matter content and low moisture supply, as well as to lower the pH of the soil where it is too high.

### **Experiment Started in 1953**

An experiment designed to find methods for adapting the blueberry to Kentucky soil and climatic conditions was started by the Kentucky Agricultural Experiment Station in 1953. Two varieties are being used, and the plants are being grown under three different systems: (1) with an 8-inch sawdust mulch; (2) with an 8-inch sawdust mulch in addition to irrigation, and (3) with irrigation alone.

The soil in one-half of each plot was acidified with aluminum sulfate. The plants (24 in each plot) were set in early spring, and after they had become estab-

lished one-fourth pound of ammonium sulfate was added per plant. One-half pound of ammonium sulfate has been used yearly since then. It was found that this large amount of nitrogen fertilizer was necessary to promote satisfactory growth on soils low in organic matter.

At the time the work was begun, the pH of the soil ranged from 7.42 to 6.23. Growth the first two years was better on the plots that were acidified with aluminum sulfate, but after that time the heavy applications of ammonium sulfate had reduced the pH of the soils of the other plots 1 to 2 points, or to an

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**Blueberries as a commercial fruit crop for Kentucky appear promising provided certain production problems can be overcome.**

(Photo: Michigan Agricultural Experiment Station)

# Varied Program Conducted by Kentucky Animal Nutrition Section Workers

**Basic research, field investigations and teaching are included in work being done here**

By ANIMAL NUTRITION SECTION

One of the great transitions in modern agriculture has been from the concept of "feeds and feeding" to "nutrients and nutrition."

As late as 25 years ago, a livestock producer needed only a limited knowledge of a few important feeds to formulate profitable rations for his cattle, swine, sheep, and poultry. However, profitable livestock feeding 1958-style requires that the farmer have a knowledge of proteins, carbohydrates, fats, vitamins, minerals, antibiotics and hormones.

In response to those needs, some years ago the Kentucky Agricultural Experiment Station initiated a research and teaching program directed toward the animal nutrition problems of the state. With unpretentious facilities, the personnel of the Animal Nutrition Section of the University's Animal Industry Group have been conducting basic nutrition research, field investigations, and both a graduate and undergraduate teaching program.

In addition to those activities, the Animal Nutrition Section maintains a research service laboratory for the Animal Husbandry, Poultry and Dairy Sections of



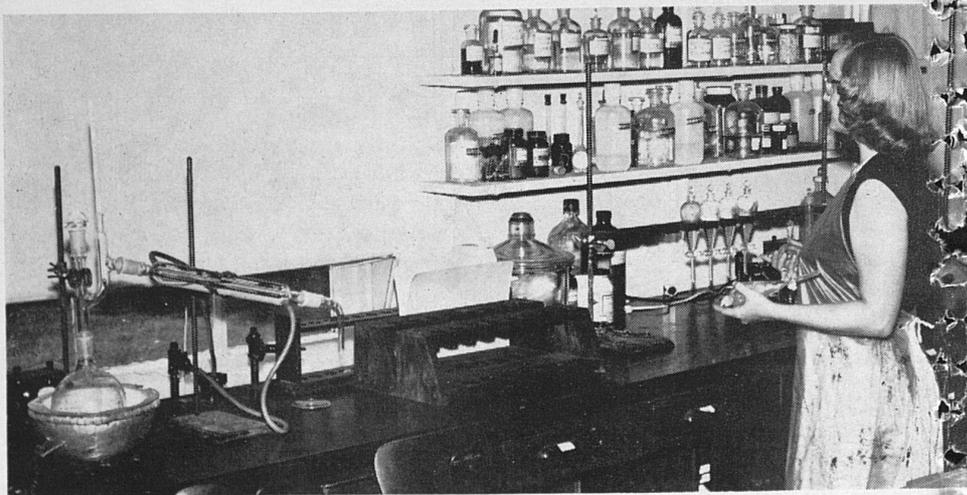
These steer metabolism stalls are being used in nutrient balance and digestibility trials. It is necessary that urine and feces be collected for analysis.

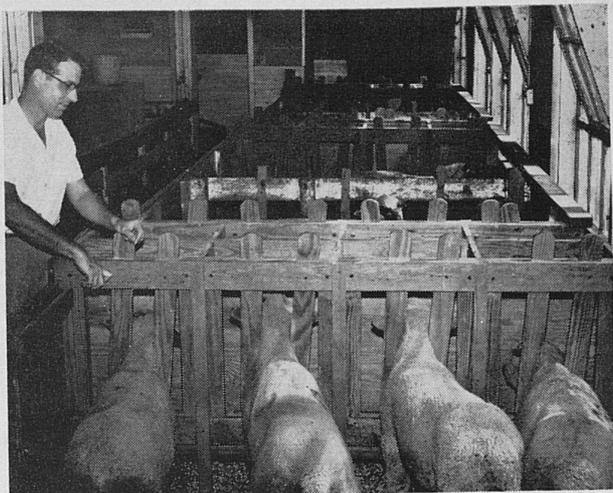
the Animal Industry Group. The more recent advances in the Animal Nutrition research program have been in ruminant nutrition through concerted effort in basic research and field investigations.

## Low-quality Roughage Utilization

An abundance of low-quality roughages is available for sheep and cattle feeding in Kentucky. Information as to the most efficient use of these roughages in main-

Several thousand analyses for the presence of chemical elements and other substances are made each year by the Animal Nutrition Section. This picture shows a worker doing copper and molybdenum analyses.





These individual sheep feeders are used for fattening and digestibility trials.



Sheep metabolism crates being used for nutrient balance and digestibility work.

tenance and fattening rations is important to the livestock economy of Kentucky. The Animal Nutrition Section has sought to improve utilization of these low-quality roughages by proper supplementation. Three low-quality roughages have been extensively studied—corncoobs, cottonseed hulls and timothy hay. Experimental results have shown that the fibrous portion, that portion containing energy in the form of complex carbohydrates, can be readily utilized in wintering rations. In balanced rations the fibrous portion of corncoobs is more readily digestible than the fibrous portion of low-grade timothy hay or cottonseed hulls. From a series of trials with sheep fed rations contain-

ing 80 percent roughage the following conclusions may be set forth:

1. Supplemental protein and carbohydrate above the requirements for maintenance did not improve the utilization of the low-quality timothy hay.
2. Neither distillers' dried solubles, live yeast nor alfalfa ash improved utilization of any of the three low-quality roughages (corncoobs, cottonseed hulls and low-quality timothy hay).
3. Digestibility of corncoobs was not improved by supplementing rations with alfalfa ash or a trace mineral mixture.
4. Increasing the starch content of a corncob ration decreased the digestibility of the fibrous portion of corncoobs. The condition was alleviated by the addition of alfalfa ash or a trace mineral mixture.

It was apparent that the mineral needs of the ruminant fed a low-quality roughage was increased by supplemental energy. For maximum efficiency of ingested nutrients in a fattening regime, the mineral intake must be adequate and balanced.

#### **Fattening and Maintenance Rations Plus Additives**

Additives such as antibiotics, diethylstilbestrol and Torula yeast have been a much worked topic in ruminant nutrition the past three years.

The following observations may be made from the numerous Kentucky trials which have been conducted with sheep fed maintenance and fattening rations.

The utilization of a maintenance ration containing 80% corncoobs was: (1) significantly decreased by supplemental aureomycin or aurofac 2A (5 or 10 mg of aureomycin-HCl per pound of ration), and (2) not affected by supplementation with 2.5 or 5.0 mg die-

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Weighing of samples in an Animal Nutrition Section laboratory. The balances are sensitive enough to detect a weight difference of a millionth of a pound.



These Michigan-Ohio hybrid tomato plants are growing in one of the two plastic greenhouses used in the Kentucky vegetable environment trials.

Spraying solutions of sugar and hormone-boron mixture, plus use of commercial fertilizers are effective in

## Raising Yields of Greenhouse Tomatoes

BY FRANK B. BORRIES, JR.

Spraying solutions of sugar and a hormone-boron mixture on greenhouse tomato plants, together with the use of commercial fertilizer, improved yields significantly last year at the University of Kentucky Agricultural Experiment Station.

The work here is contributing to a regional research project (S-32) on the effect of environment on vegetables, being undertaken by Kentucky and seven other southern state agricultural experiment stations, the experiment station of Porto Rico, and the U. S. Department of Agriculture.

### Environmental Factors Studied

Environmental factors being studied include light, temperature, relative humidity, soil and fertilizer. Only tomatoes have been used in the Kentucky tests, which have been conducted in a conventional greenhouse and in two types of plastic greenhouses.

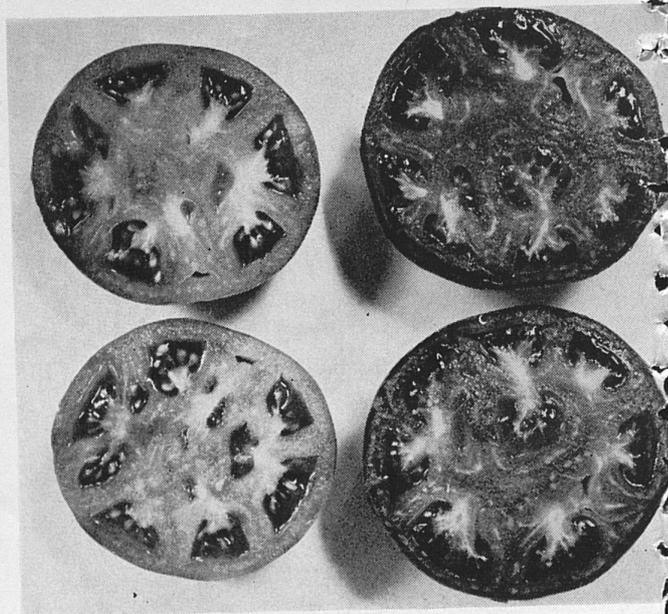
The following results of the first-year trials, as released by Dr. E. M. Emmert, of the Department of Horticulture, are stated in terms of pounds of fruit per plant of early-harvested tomatoes:

Tomatoes grown in the glass greenhouse—check plot, 4.2 pounds; sugar only applied, 5.5 pounds; sugar combined with a hormone-boron preparation, 5.7 pounds; and a sugar-hormone-boron combination with fertilizer, 6.3 pounds.

Tomatoes grown in a standard-type plastic green-

house—check plot, 3.0 pounds; sugar only, 3.5 pounds; sugar-hormone-boron, 3.5 pounds; and sugar-hormone-boron-fertilizer, 4.2 pounds.

Tomatoes grown in a heavy-plastic greenhouse—check plot, 2.2 pounds; sugar only, 3.1 pounds; sugar-



Tomatoes on the right were the result of the sugar-hormone-boron combination. In contrast to the fruit from the check plots (left), fruit from the treated plots was larger and fleshier, sweeter and had fewer seeds.

hormone-boron, 3.1 pounds; and sugar-hormone-boron-fertilizer, 3.3 pounds.

Glass-house early yields were larger because the plants were set sooner and the harvest period was longer.

### **Total Yields Higher**

As for total yields, the plants averaged about 18 pounds of fruit per plant, considerably above the usual 12 pounds-per-plant average of spring crops. The highest total yield, nearly 19 pounds per plant, was obtained in one of the plastic greenhouses, while the highest yield in the glass greenhouse was about 17 pounds.

The sugar was in the form of a 0.125 molar solution. The hormone-boron material, a commercially marketed product, consisted of a synthetic growth-regulating substance and a soluble boron compound. The product was developed by Dr. Emmert and a patent protecting it has been applied for by the Kentucky Research Foundation of the University of Kentucky. The commercial fertilizer consisted of various soil applications of ammonium nitrate, 43% acid phosphate, and potassium sulfate.

According to Emmert, the hormone (a synthetic) acts to stimulate growth; the boron activates the hormone and helps in the assimilation of sugar by the plants, and the sugar provides a source of carbohydrate for growth when photosynthesis is curtailed, such as during days of short-light periods.

Associated with Dr. Emmert is Dr. Dudley Martin and Cornelius Wilson, Jr., technician, also of the Horticulture Department.

### **Work of Animal Nutrition Section**

*(Continued from page 5)*

thylstilbestrol per animal daily via the feed or a 2.5% supplement of Turula yeast.

Diethylstilbestrol at the level of 0.5 mg per pound of a self-fed, pelleted, fattening ration that contained 50% corncobs significantly increased the gains of feeder lambs during a 59-day feeding period.

### **Bloat**

An ever-prevalent problem in a pasture program using legumes such as alfalfa and Ladino clover, bloat has been studied through laboratory and animal investigations for the last 3 years. These investigations prompted the Animal Nutrition Section to report in 1955 that one of the factors contained in alfalfa that was involved in the production of bloat had the following properties:

It is heat-stable, soluble in water, non-protein in

nature, slightly soluble in methyl alcohol, dialysable, and adsorbable on charcoal. The factor studied in the laboratory was shown to produce bloat in sheep when given to the animal via a stomach tube. This type of study is an excellent example of how animal studies and purely laboratory techniques may be coordinated in a concerted effort to solve one of the many complex problems in ruminant nutrition.

### **Field Investigations**

For many years the Kentucky livestock producer has been plagued by losses from grass tetany. Five years ago the Animal Nutrition Section with the Animal Pathology Department initiated an investigation of grass tetany in Kentucky. The most logical approach seemed through production of the condition in controlled experimental animals. After three years' investigation it became apparent that uncomplicated grass tetany could not be produced in ewes under practical or semi-synthetic feeding regimes on the University of Kentucky experimental farm. Therefore, the greatest progress was made through field investigation.

In all cases of grass tetany in cattle studied in 1955 from the field the symptoms of grass tetany were observed by an attending veterinarian. Only 2 cases of the 20 exhaustively studied responded to accepted therapy for grass tetany cases. A typical symptom of the Great Plains grassy tetany is a deficiency of magnesium in the blood. In most of the cases studied near Lexington the blood serum magnesium was normal. However, it was noted that a deficiency of copper existed in most of the cases investigated. This low-blood copper and the poor response to accepted therapy for grass tetany indicated the presence of a complicated grass tetany syndrome in Kentucky cattle.

### **Research Service Laboratory**

The staff of the Animal Nutrition Section operates in conjunction with the teaching program a research and service laboratory for the Animal Husbandry, Poultry and Dairy Sections. Analyses for major and minor elements, protein, ash, moisture, crude fiber, crude fat, cellulose, lignin, and plant pigments, and determinations to indicate the characteristics of animal tissues are conducted for research workers in Animal Industry. During the year of 1957, 11,000 determinations, or approximately 4,000 samples, were analyzed. Its research program, coordinated with its expanding graduate program, has pushed the Animal Nutrition Section forward to recognition. With expanded and adequate facilities, more research data, basic and applied may be evident.

## Blueberries for Kentucky?

(Continued from page 3)

acidity level approaching the optimum pH for blueberries. The plots where the pH exceeded 6.5 suffered considerably from chlorosis the first two years until the soil became more acid. Consequently, it is not considered practical to attempt to raise blueberries on soil having an initial pH in excess of 6.2. (County agent offices will furnish directions on how to make soil tests.)

The blueberry plants have responded best to the treatment of 8 inches of sawdust mulch which was irrigated. The next best response has been on the plot given only an 8-inch mulch of sawdust. The irrigation-alone treatment has not been satisfactory.

Production has been high in the best plots, several plants producing over 8 quarts. Last year the average was 4.4 quarts per plant for those mulched and irrigated. The mulched plot which was not irrigated averaged 1.66 quarts per plant, which was the same average as the plot which was irrigated only. These averages are based on surviving plants; consequently, because of better survival the total production of the mulched plots was significantly higher than the plots which received irrigation only. Three plants did not survive on the mulch-plus-irrigation plot, 4 died on the mulched but not irrigated plot, and 15 were lost on the plot which received irrigation only. Total plant growth paralleled the production pattern of the respective plots.

Two principal difficulties must be overcome before commercial production of blueberries can be successful in Kentucky. A tremendous volume of mulching material will need to be available; as for sawdust, the supply would soon be inadequate. Tests are being set up to find other suitable mulches. The other problem to be overcome would be the control of birds attracted to the ripening berries. Control would be especially necessary in the case of small plantings.

## Varied Research Projects Reported

By FRANK B. BORRIES, JR.

Researchers at the Kentucky Agricultural Experiment Station recently completed a number of varied projects concerning certain crop and animal production problems, summarized as follows:

**Forage crops**—The four alfalfa varieties recommended for Kentucky—Atlantic, Buffalo, Ranger and Narragansett—maintained yield superiority last year. A French variety did well but is being checked further because of a tendency to cold susceptibility and because it is somewhat stemmier than others.

**Strawberries**—Virus-free strawberry plants yielded as much as 108 24-quart crates per acre more than the non-virus-free type in 1957 tests.

**Beef bull performance**—In beef bull performance testing the highest-daily-gaining bulls averaged 3.63 pounds, the lowest, 1.83½ pounds. In one test, the average daily gain was 2.51 pounds per head, highest rate of gain was 3.51 pounds, and the lowest, 1.83 pounds. In the second test, average daily gain was also 2.51 pounds, highest individual, 3.75 pounds daily gain, and the lowest, 1.84 pounds. Amount of feed per hundred pounds of gain ranged from 704 for the most efficient bull to 888 for the least efficient, in one test; and 703 pounds to 1,202 pounds, respectively, in the second.

**Weed control**—Several "promising" materials for weed control in vegetables were found last year. Simazin, Premerge, Sinox, CIPC, Alanap, Vegedex, Natin and Radox were checked on sweet corn, beans, potatoes, onions, cucumbers and cole crops. No really satisfactory material was found, however, for weed control in tomatoes.

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