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Kansas State
Agricultural College

Bulletin No. 136—June, 1906

All Departments

Press Bulletins Nos. 125-151

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Experiment Station
of the
Kansas State Agricultural College
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All Departments—Press Bulletins 125-151

Introduction.

The Station Council issues herein the fourth collection of its Press Bulletins. These, originally prepared for the agricultural and other papers, on topics of special interest at the time, include in many cases matter of permanent value. They are therefore here reproduced and furnished to all on the mailing list. The attention of our patrons is called to the fact that the Press Bulletins are sent to all papers in the State and, if your interest in them is such as to lead you to make the effort, there can be little doubt that any paper can be induced to print them regularly if its editor is shown that his readers desire them. The Press Bulletins are not for general distribution. The Bulletins are sent free to all applicants.

Press Bulletin No. 125—Agricultural Department.
July 3, 1903.

Meadow Fescue.

Meadow fescue, *Festuca elatior pratensis*, usually known by the name of "English blue-grass" in Kansas, was introduced from Europe, but is now widely cultivated in the United States, and has become thoroughly naturalized, being found wild in some localities on the roadsides and in pastures and meadows. There seems to be no good reason for calling it "English blue-grass," other than that the grass is grown largely in England as a meadow and pasture grass, supplying perhaps in a measure in that country the use which the Kentucky blue-grass has in the United States. Meadow fescue is a tufted grass, more spreading in habit than orchard–grass but not so rank and rapid a grower. It attains its

best development the second or third year after sowing. In some of its features it resembles Kentucky blue-grass, the leaves have a bluish tint and the stems are rather stiff and wiry, but the panicle or head is narrower or less open than that of the blue-grass. It flowers later than the blue-grass, but the blades start early in spring. The quantity of foliage is not great but the grass is rich in nutritive matter and well liked by stock, both as pasture and hay. It has generally been considered better for hay than for pasture because of its habit of growing in tufts, but in Kansas, in the localities where it is most successfully grown, it is considered an excellent pasture grass. Quoting from a Kansas grower, J. S. Gilmore, Fredonia, Kan., in the Twelfth Biennial Report of the Kansas State Board of Agriculture: "It furnishes more pasturage than any other of the tame grasses (not including alfalfa), comes early and lasts almost as late as any, and cattle thrive on it; it stands extreme cold and dry weather well, it restores and improves the soil, and does not require, like most tame grasses, the best land on the farm for a start and prosperous growth."

Meadow fescue is grown successfully in the area south of the Kansas river and extending westward from the Missouri line about a hundred miles. "The grass has been grown at this Station (120 miles west of the Missouri line) since 1879." It winterkilled in the winter of 1885-'86 and apparently has suffered more than orchard-grass from drought. As a pasture grass, orchard-grass has stood better than meadow fescue at this Station and furnishes more and better pasture. When cut for hay, yields of one to one and one-half tons per acre have been secured.

"Meadow fescue thrives best on the richest and heaviest soils, although it is grown principally on the slopes and uplands." In eastern Kansas it will do well on any land which will produce profitable corn crops.

In Kansas the grass is grown chiefly for its seed. Kansas is said to produce 75 per cent of the seed crop of the United States. Johnson county leads in the production of seed. The seed finds a ready sale in the European countries, where it is sown for meadow and pasture. The price is regulated by the supply and the foreign demand and has ranged from two to eight cents per pound. The largest seed crop produced in Kansas was harvested in 1896, and was estimated at 3,360,000 pounds. The yields of seed for the first three or four years after seeding average 6 to 12 bushels per acre (24 pounds per bushel), although yields of 15 to 20 bushels per acre have been reported. In from three to five years the grass makes a less vigorous growth and the yield of seed decreases.

The practice is to break the sod at the end of the fourth year and rotate with corn and other crops for a few years before seeding down again.

Preparing the Seed-bed. —It pays to carefully prepare the seed-bed in sowing any kind of grass seed, and the following suggestions will apply to alfalfa and other grasses as well as meadow fescue. The ground should be plowed several weeks or months before seeding time, and cultivated at intervals to clear it of weeds, conserve the soil moisture and put the soil in the best possible condition to sprout the seed and start the young plants. The seed-bed should be finished with a level, mellow surface, but with a rather compact subsurface, in order that the seed may be evenly covered and come in close contact with the moist soil. The seed should not be covered more than an inch to an inch and a half deep.

It is possible to prepare an excellent seed-bed without plowing. Wheat or oat stubble disked soon after harvest and disked and harrowed at intervals until September 1 makes a good seed-bed for fall sowing. For spring sowing, corn or Kafir-corn ground prepared by double disking and leveled with a float or harrow is usually preferable to spring plowing.

If it is necessary to plow just before seeding, the ground should be firmed by the use of the subsurface packer, float or roller. The disk harrow may be made to do the work of the subsurface packer in part by setting the disks rather straight and weighting the harrow.

Seeding. —"The quantity of seed recommended to plant per acre varies from a peck to three pecks when producing seed is the main object, and from one bushel to three bushels when pasturing alone is sought." On a well-prepared seed-bed in a favorable season, a practical method is to sow broadcast and to harrow once lightly to cover the seed. Many favor drilling, and this is perhaps the surer method of getting a good catch in the average season. The danger in planting with the drill is in getting the seed too deep, but if the ground is level and not loosened too deeply, the depth of seeding can be properly regulated.

Many practice fall seeding with good success, but it is not advisable to seed in the fall unless there is sufficient moisture in the soil to sprout the seed at once and insure the early growth of the young plants. A good catch of grass is more apt to be secured by the average farmer in the average season from early spring seeding, because the natural conditions are favorable for the germination of the seed. On the other hand, "a fall start brings a seed crop a year sooner and the grass gets dominant in advance of

the weeds." There is slight danger of winter-killing if the grass starts well and the seed-bed was prepared with a moderately firm subsurface. With a deep, loose seed-bed, freezing and heaving out is much more apt to occur. Plant good, clean seed. The best seed is the cheapest to buy.

Harvesting. —Meadow fescue should be cut for hay soon after the blooms fall. It is ready to cut for seed as soon as the heads turn brown, before the seed begins to shatter. This occurs right after wheat harvest. The usual method is to harvest with a self-binder and shock the same as wheat or oats. The crop may be stacked or thrashed out of the shock, with the ordinary separator. The seed is usually sold at once, but may be safely kept in dry bins or in sacks.

Other Grasses vs. Meadow Fescue. —The fact that meadow fescue has proven to be a profitable crop when grown for seed has perhaps caused it to be valued more highly as a pasture and hay grass than it really deserves. Although no good comparative tests have been recorded, yet the general use of the grass at this Station has shown it to be inferior to orchard-grass, both as a hay and pasture grass It does fairly well for pasture when sown with orchard-grass, the two grasses making a better sod than does orchard-grass alone. For pasture, it is usual to sow about fifteen pounds each of orchard-grass and meadow fescue with three or four pounds of red clover per acre.

Brome grass *(Bromus inermis)* has only been grown at this Station in a field way for four years. It has been cut for hay and seed and is being used for pasture the present season. As far as it has been tried, it is far superior to meadow fescue both as a hay and pasture grass. It is more productive, more hardy, a better drought resister, thrives in wet weather too, makes a better sod, stock eat it readily, and it is practically equal in feeding value to the meadow fescue. I have little hesitation in recommending it for planting for all parts of the State as far west as Ellis county. It will doubtless thrive best in the northern counties of the State. At the Fort Hays Branch Station, Superintendent Haney reports a poor catch and crop from sowings made last fall. The spring sowings are much better. At this Station both fall and spring sowing have succeeded well. *Bromus inermis* may be sown broadcast, on land prepared as described above, at the rate of 18 to 20 pounds of good seed per acre. A. M. TEN EYCK.

Press Bulletin No. 126—Animal Husbandry Department, July 21, 1903.

Corn Ensilage for Steers.

During the past winter (October 10, 1902 to June 8, 1903) the Kansas Experiment Station fed a lot of ten steers on corn ensilage, chopped alfalfa hay, and a grain mixture of equal parts ground corn and Kafir-corn in comparison with another lot of twenty steers of the same average weight and quality fed exactly the same feed except ensilage. The results are shown by the following figures:

LOT.	No. of steers.	Total gain of lot, pounds.	Grain consumed per 100 lbs. gain, pounds.	Roughness consumed per 100 pounds gain.	
				Ensilage, pounds.	Chopped alfalfa, pounds.
With Ensilage	10	4468	715	471	327
Without Ensilage	20	8359	733		483

From the above figures it will be seen that for every 100 pounds of gain the 471 pounds of ensilage saved 18 pounds of grain and 156 pounds of alfalfa. At the market prices of these feeds (54 cents per cwt. for grain and 27½ cents per cwt. for alfalfa), the 471 pounds of ensilage made a saving of 52.62 cents.

The steers were shipped to Kansas City and sold at the stock yards June 23, at the following prices:

Lot with Ensilage . . . . . $4.95 per cwt.
Lot without Ensilage . . . . . .4.70 " "

Here is a gain of 25 cents per cwt. in the selling price in favor of the ensilage steers. Adding this to the 52.62 cents already saved it makes the 471 pounds of ensilage worth 77.62 cents, or at the rate of $3.29 per ton.

Making the above comparison on the basis of roughness alone, the 471 pounds of ensilage plus the 329 pounds of alfalfa in the ensilage lot is equivalent to the 485 pounds of alfalfa in the lot without ensilage. This shows that the 471 pounds of ensilage was equivalent to 156 pounds of alfalfa. At this rate, 3.02 tons of corn ensilage is equivalent to one ton of alfalfa hay.

When sold the ensilage lot was pronounced excellent cattle and fat enough for the ordinary trade. After the cattle were slaughtered and placed in the cooler, Armour & Co. went over the carcasses. The ensilage lot contained the largest per cent of fat—just the right amount for the packer's trade. The carcasses showed good quality, with very little waste, and would be salable in any market. The loins and chops were pronounced excellent.

The lot without ensilage was considered a nice assortment of cattle but they were not nearly as well covered with fat and did not meet the requirements of the dressed beef trade as well as the ensilage lot.

Average farm land in an average season will produce from 12 to 15 tons of green corn per acre. Good bottom land under favorable conditions will produce from 20 to 25 tons per acre. Assuming that land will yield only 10 tons per acre, there is an income according to the above experiment of $32.90 per acre.

Corn ensilage has been proven a most desirable feed for dairy cows. This experiment, as well as the experience of others who have fed ensilage to steers, indicates that it is a very important factor in economical beef production. D. H. OTIS.

Press Bulletin No. 127—Veterinary Department.
July 28, 1903.

Rabies, or Hydrophobia.

Rabies, commonly called hydrophobia, has been unusually common among cattle in Kansas, at least seven outbreaks having been reported during the past year. Rabies does not occur most frequently during hot weather, as is generally believed, the greatest losses occurring during the fall and spring, but it may occur at any season of the year. The disease seems to appear periodically, some years no outbreaks being reported, and other years the losses are frequent and severe.

Rabies is a disease of the nervous system that is transmitted from one animal to another by direct inoculation through a wound, usually a bite from a rabid animal. It is possible that food or water contaminated by an animal affected with rabies may infect animals having sores in the mouth or digestive tract, or the infected saliva being deposited upon an open wound or irritated mucous membrane may cause the disease.

The disease, as observed during the past year, has been among cattle, except in one instance where two horses died. The loss among cattle has varied from five to twenty-seven head. In one herd of sixteen head, eleven died from rabies.

In four out of the seven outbreaks reported, a dog supposed to be rabid was known to have bitten or been among the affected cattle. The disease usually occurs in from five to ten days after the animals are bitten, and, among cattle, they may continue to develop the disease for from eight to ten weeks after the first case occurs.

The symptoms vary considerably even among cattle. The affected animal becomes nervous and excited, in many cases vicious, attacking persons and smaller animals, particularly. In some instances they will dash at a person but suddenly stop a few feet away. There is a peculiar wild or vacant stare. Affected cattle will often push and maul other animals in the herd, and there is a tendency to lick the genital organs of other cattle. As the disease progresses they become more excited and will often emit a hoarse bellow frequently or almost continuously. In many cases there is often violent straining as if to pass dung, the rectum often being everted. Paralysis often occurs, and is first noticed in a wobbling, uncertain gait, and later the hind quarters give way and the animal is unable to rise. In a few cases the animals will fall in convulsions. In all cases animals will eat and drink water until paralysis of the throat makes it difficult or impossible. There is frequent shaking and swinging of the head and opening of the jaws, with dripping of a ropy or frothy saliva from the mouth. There is a tendency for rabid animals to eat dirt, dung, sticks, etc.

Post-mortem examination shows no signs of disease, although the body is unusually stiff and rigid and the stomach contains dirt and other foreign material.

There is no treatment for rabid animals, as death always occurs. Affected animals should be isolated, or destroyed at once to put them out of misery, and to prevent possible infection of others. Water tanks and mangers should be emptied and thoroughly disinfected by using a strong solution of concentrated lye, or a five per cent solution of carbolic acid. Food contaminated with saliva should be burned. Suspected dogs should be destroyed. Persons should exercise utmost caution to avoid being bitten or infected through wounds on the hands while caring for infected animals.

Persons knowing of rabies are asked to report to this department, giving all the information possible regarding the outbreak, as a future bulletin is contemplated treating the disease in detail.

N. S. MAYO.

Press Bulletin No. 128—Entomological Department.
August 4, 1903.

Preventive Work Against the Hessian Fly.

The crop season just past has seen much damage from the Hessian Fly in the Kansas wheat region, and the correspondence of the office of the entomologist of the Kansas State Experiment Station has shown that too many farmers are still unacquainted

with, or do not practice, the widely published modes of lessening the destructive abundance of this, one of our chief wheat pests. As preventive measures for the preservation of next year's crop, if they are to be effective, must be undertaken at once, and as the season seems in every way to give promise of abundance of the fly in the fall planting, unless all possible measures are taken to avoid it, wheat farmers should be warned, and should enlist neighborhood cooperation to the greatest possible extent, in putting into practice such means against the pest as are warranted by experience.

As the last brood of the fly remains in the pupa or flaxseed state in the straw until near the time of the growth of the newly sown grain, it is the practice of many to burn off the stubble as soon after the grain is cut as possible. Where the wheat has been cut with the header this will kill the pupœ remaining in the stubble, practically all in the field. If this is done throughout an entire neighborhood, the number of adult flies left to deposit eggs in the growing wheat will be reduced to the minimum. It has been claimed for this practice that by it all field pests are destroyed, and that a valuable coat of fertilizer in the form of the ashes will be left on the field. With respect to these, the first claim is much too broad, as few insects except the fly and its own parasites will be burned, since they are not in the stubble at this time; and no one can rightly claim that the ashes left by burning are superior to the whole stubble turned under to add to the humus content of the soil, the reverse being true, and one of the most important of the manurial elements, the nitrogenous, being dissipated by the burning. It will thus appear that of the two methods, that of plowing under the stubble is the better; but to be of avail against the fly, it must be done early, and the ground should then be well levelled by the use of the harrow or disker.

The exact appearance of the mother fly after harvest is determined by moisture conditions, continued dry weather tending to retard the change from the pupa. But moisture sufficient to cause the growth of volunteer wheat will also bring to maturity many of the flies, and these will proceed to deposit their eggs in the volunteer growth. While we have no evidence of a third brood in the State, it is not at all unlikely to occur if conditions favor. As the first developed flies show such a partiality for the volunteer growth, it is possible to cause them to exhaust their egg-laying capacity by providing an early growth in which to deposit, by sowing early strips around or through the fields to be resown to wheat, the growth on these strips to be thoroughly

covered under before the main crop is put into the ground. The destruction of this growth should be deferred to the latest moment, that all mature flies may have the opportunity to deposit eggs therein; and this provision for the early exhaustion of the females in egg-laying is the particularly important feature of the practice of trap-strip sowing.

The experience of Kansas growers has abundantly confirmed the argument that late sown wheat is safer from the fly. The basis of this argument is that the adult insect is very readily destroyed by a sharp frost, and that wheat appearing above the ground after the first sharp frost of the season is not infested. While it is impossible to determine the proper date in advance, observing farmers can readily approximate very closely to it for their own locality, and it is ordinarily safe to seed to wheat at such a date that the new growth shall appear after the average date of the first frost, as shown by the weather service records for a given region. The records of the College Station, for example, show this average to be October 5, and this date is doubtless not far from the true one for the central counties. To the north and west it will be somewhat earlier, and to the southward of this Station, somewhat later than the date named. The practice of late seeding is the chief reliance of some of the most intelligent farmers in the Kansas wheat region, and should be given a much more general trial by growers throughout, whether in connection or not with the other suggestions given above, for there is nothing to be gained by early growth if the plants are to be practically killed by the fly before winter, as has been often the case.

E. A. POPENOE.

Press Bulletin No. 129—Agriculture Department, September 1, 1903.

Bromus Inermis.

Bromus inermis (smooth, awnless, or Hungarian Brome grass) is a very hardy perennial grass, with smooth upright stems from 18 inches to 3½ feet high, and with open panicles or seed heads 4 to 8 inches long. It has a very heavy system of roots and underground root-stocks, which after it is well established makes a very tough sod and gives it great drouth-resisting qualities. It is a native of Europe and Asia, and has been known for over a hundred years, but was not cultivated until a few years ago, because it was thought it would become a pest similar to quack grass if cultivated. During the last decade, it has come very rapidly into prominence in this country. It has been grown in most of the

western and northwestern states and reports have been made by the North and South Dakotas, Nebraska, Colorado, Montana, Wyoming and Idaho experiment stations. These reports have been favorable to the grass. Because of its great drouth-resisting qualities, *Bromus inermis* is especially adapted to the drier portions of the State and will grow in places where none of the other tame grasses will survive. It is also well adapted to practically every other portion of the State, as it is able to thrive under wet conditions as well as dry. It also makes a good growth in shady places, where most other grasses will not do well. It will produce most abundantly on rich, heavy soils, but will grow on poor, thin soil better than most of our other grasses.

Bromus inermis for Pasture.— Bromus inermis makes an excellent pasture grass, as it shoots up in the spring about two weeks earlier than any of the native grasses, produces a good aftermath or second growth, and continues to grow especially late in the fall. If the summer is dry it will stop growing, and start again after the beginning of the fall rains, but if the dry period is not too long it will continue to grow from early in the spring until late in the fall. At the Kansas Station we have grown *Bromus inermis* in a field way for four seasons. This summer we have pastured some young stock, ranging from 9 to 18 months of age, on a field of *Bromus inermis* seeded last fall. These calves have not shown any noticeable preference between Kentucky blue-grass, prairie-grass, and *Bromus inermis,* and have thrived well on the *Bromus inermis.* The grass stands tramping by stock exceedingly well. It is so vigorous that it will run out all weeds and other grasses, after it once becomes well established. It, however, may be sown with other grasses and legumes, and allowed to take full possession in a few years.

Bromus inermis for Hay.— Bromus inermis will also make a very satisfactory crop of hay, yielding from 1½ to 4 tons per acre, according to the season and richness of the soil. It may usually be cut twice during the season. The first crop is sometimes cut for seed by a self-binder, raising the cutter bar as high as possible and cutting off the heads and then following in the same swath with the mower to cut the hay. The bundles may be left upon the swaths of hay until the hay is raked, when they may be shocked up between the windrows, thus carrying on the processes of haying and harvesting in the same field at the same time. The yield of seed varies from 200 to 400 pounds per acre. It should be cut for hay just after the bloom falls. The hay is relished by all

kinds of stock, and its feeding value is fully equal to that of timothy or prairie hay.

Preparation of Seed-bed.— It is quite essential to prepare a proper seed-bed. In order to conserve the moisture and sprout the seeds, the soil should be well firmed. The ground should be plowed some time before seeding, so as to become thoroughly firmed and settled by the rains, or if it is impracticable to do this a subsurface packer or similar implement should be used to follow the plow and pack the soil. The ground should be harrowed at frequent intervals until seeding time, and special pains taken to prepare a thoroughly pulverized seed-bed near the surface. If the ground is not too hard and is comparatively free from weed seeds, an excellent seed-bed may be prepared with a disk-harrow and other surface-working implements. This method insures a firm subsurface, the importance of which has just been mentioned.

Seeding.— *Bromus inermis* should preferably be sown in the spring, and as early as it is possible to prepare a suitable seed-bed, thus insuring plenty of moisture to start the young plants and keep them growing until they have sufficiently developed root systems to enable them to survive the dry periods we are apt to have later in the season. If sown in the spring the ground should be plowed in the autumn, if thought best to plow at all. *Bromus inermis* may also be seeded in the fall; and if the season is favorable as good a catch may be obtained as in the spring. If sown in the fall, sow from the first to the middle of September. It is not advisable to sow *Bromus inermis* with a nurse crop except in localities where the soil drifts badly by the winds. This grass will hold the soil from drifting after it has a few weeks' growth. The best apparatus of which I know for seeding *Bromus inermis* is a wheel-barrow broad-cast seeder, with a hopper made especially for sowing this seed. This should be followed by an ordinary smoothing harrow. It may be seeded by hand by a man experienced in this method of seeding. The ordinary grain drills have not proved satisfactory generally, as it is very difficult to get the seed to pass through the seed cups of the drill. Sow 18 to 20 pounds of seed per acre. Seed may be secured of any of the reliable seed houses of the West. The price varies from $10 to $15 per hundred pounds, according to the grade of seed and the firm with which you deal. It pays well to get a good grade of seed. If you cannot afford to purchase sufficient seed for a large area, get a small amount of seed of a good grade, sow it on a carefully prepared seed-bed, and raise your own seed with which to sow a larger area.

Renewing the Crop.— After the third year the roots and underground root-stocks develop such a dense mat that there is neither room nor nourishment for them to continue their growth, and the field becomes sod-bound, the production being materially decreased. Several remedies are recommended: one is to disk thoroughly with the disk harrow, another to plow and then thoroughly firm the sod with a subsurface packer or heavy roller. Where re-seeding is not too difficult, and where the land can profitably be used for the growing of other crops, the most practical method of renewing the grass is by re-seeding.

Killing the Sod.— *Bromus inermis* cannot be considered a pest notwithstanding its hardiness. No experiments in destroying the grass have been conducted at this Station, but the trials of other stations have demonstrated that it can be successfully killed out by breaking, after the removal of the hay crop, disking at intervals, and back-setting in the fall. V. M. SHOESMITH.

Press Bulletin No. 130—General Department.
January 26, 1904.

Poison for Prairie-Dogs and Other Rodents.

The supply of Press Bulletin No. 119 of the Experiment Station, containing information about our "Poison for Prairie-Dogs and Pocket-Gophers," having been exhausted, this bulletin is issued to answer the numerous inquiries we are receiving about the poison.

The legislature, at its last session, made provision for continuing the work of preparing and distributing poison from the College at the cost of the materials contained in it. During the past two years, since January 7, 1902, the demand for poison has continued steady, and large quantities have been sold, especially for the destruction of prairie-dogs and pocket-gopher. Up to the present time we have consumed about 1200 pounds of strychnine and over a half ton of potassium cyanide in manufacturing the poison. From 600,000 to 700,000 acres of land, formerly infested with prairie-dogs, have been entirely reclaimed, while a partial destruction of them has been accomplished over a much larger area. The destruction of pocket-gophers has been accomplished over many small, and widely scattered areas, including some of the best alfalfa ranches in the State. This work, however, has thus far not extended over sufficiently large areas to be permanent; and further and united efforts, only, will produce results which will prevent loss to alfalfa growers from the presence of this pest.

For Prairie-Dogs.— The poison is put up in half-gallon cans. They have labels which describe the contents, name the ingredients, the quantity of each, the manner of preparing, and also give careful directions for using.

The strychnine in this poison is not in solution, but is held in suspension in the syrup. It settles to the bottom of the can, after the manner of lead in ordinary mixed paint. A common error in using it is to pour out a portion of the liquid without first having throughly shaken or stirred it. When thus used, this top part of the liquid is not sufficiently poisonous to kill all the animals that eat of it. If it is first stirred or thoroughly shaken, a part of the can may be used as successfully as the whole of it.

We recommend that the area of "dog town" to be poisoned be gone over very carefully, placing the bait at the outside of all occupied burrows, as directed. If some of the animals escape the first application, a change of bait to Kafir-corn, broken corn, or corn-meal is recommended for those that remain. If after a second application any animals remain, carbon bisulphide will probably be the most effective means of destroying the remnant.

The price of the prairie-dog poison is *$1.75 per can*, delivered at the freight or express office in Manhattan. Three or less cans may be sent by express, wrapped in paper, but a larger number must be boxed. Any number of cans may be sent by freight, but they must be boxed. No charge is made for packing. A can of the poison weighs five and a half pounds. It will poison a bushel of wheat, and be enough for about 1200 burrows (from 120 to 160 acres).

For Pocket-Gophers.— We have found that this poison is excellent for destroying pocket-gophers, and that it is even more convenient to use than the dry strychnine and potatoes or raisins recommended in Press Bulletin No. 109. The poisoned bait is to be inserted into the run-ways of the gophers in the same manner as described in that bulletin.

The poison for gophers is put up in quart cans, and by leaving out one ingredient (potassium cyanide) the strychnine is kept in solution. The liquid is therefore equally poisonous throughout, and any part of the contents of the can may be successfully used. A quart will poison a half-bushel of grain, and the price of it is *90 cents per can.*

Pour boiling water over a half-bushel of shelled corn and let it stand over night to swell and soften the grain. Then drain off all the water possible, and pour the quart of poison and a cup of syrup over the corn. Add a few pounds of corn-meal and mix

all thoroughly. The mass of corn should be somewhat sticky, and there should be no dry corn-meal present.

Make openings into the run-ways of the gophers with a pointed stick, and with a spoon drop a few kernels of the corn down each opening. A spade or shovel handle shod with an iron point and having a bar for the foot about sixteen inches from the point is recommended for making the holes into the burrows. No digging or covering of holes is required.

The best time to poison gophers is in October and November, when they are most active; but they may also be successfully poisoned in the spring or at any time when they are working. It is not usually necessary to go over the ground with poison more than once, but unless neighboring farmers cooperate, the work will have to be attended to about once in two years.

For Mice and Prairie Squirrels.— We have recently had considerable complaint of the destruction of young orchards by field-mice. Experiments in the use of this poison to kill the mice have been very successful. We use the gopher poison with wheat as a bait. The poisoned wheat is eaten readily, and two or three applications will easily destroy all of the pests in an orchard. For prairie squirrels the poison is used in the same manner, the wheat being placed near the openings of their burrows.

For Rabbits.— Corn poisoned as directed for pocket-gophers has been used successfully for these orchard pests. Kafir-corn is also a good bait, but perhaps the most successful method of all is to use prunes, pieces of apple, or sweet-potato as a bait. Dry powdered strychnine may be rubbed on the cut surface of the bait or our liquid poison poured over the pieces.

For Rats.— Rats about barns or corn-cribs are hard to poison because they have such an abundance of food at hand; yet they will often leave unpoisoned grain to eat that which has been poisoned with our poison. While we do not claim that it will entirely exterminate rats about farm premises, we are sure that the pest can be greatly reduced in numbers by its use. As in the operations with this poison, or any other form of strychnine, against all rodents living in burrows, the great majority of the victims die in the burrows and are never seen. For this reason it is not a desirable means of destroying mice in occupied dwellings. In all cases of its use great care is necessary to avoid placing the poison

or baited food where it might be found by domestic animals or persons ignorant of its deadly character.

Orders for poison should be accompanied by payment, and should state for what purpose the poison is desired. Make money orders or drafts payable to Miss Lorena E. Clemens, who is Secretary of the College. Method of shipment preferred should also be stated. The poison cannot be sent by mail, and we do not ship it outside of Kansas. D. E. LANTZ, *Agent*.

Press Bulletin No. 131—Veterinary Department.
February 9, 1904.

Warbles or Grubs in Cattle.

Recent observations made and reports received by this Department indicate that warbles or grubs in cattle are unusually prevalent. In some instances they are reported to have caused the death of young cattle.

Warbles or grubs are the larval form of the ox bot-fly or heel-fly (Hypoderma lineata). The grubs or warbles are noticed as little lumps or bunches just beneath the skin of the back. Directly over each warble there is a small pore or opening in the skin through which the grub breathes.

Life History. —The adult heel-fly or warble-fly is a little larger than the common house-fly. In the latter part of the summer she deposits her eggs upon the hair of cattle in the region of the heels. The presence of the flies among cattle causes much annoyance. The animal licks the part and the larvae are taken into the mouth. From the throat or gullet the small larve bore their way through the tissues until they locate beneath the skin of the back, where they increase in size quite rapidly so that the lumps are large enough to be noticed by the latter part of December or early January. In February or March these larva or grubs work their way out through the small hole in the skin, fall to the ground, burrow into dirt or litter, pupate, and some weeks later transform into adult flies.

In 1895 it was estimated that 60 per cent of the cattle in Kansas were affected with warbles, and the financial loss by damaged hides was estimated for the United States at from fifty to sixty million dollars. Grubby hides are usually "docked" about one-third.

Warbles are more prevalent in the western part of the State and attack young animals more severely than older cattle.

As the adult files do not travel far, a cattle owner can free his herd pretty well from these pests by treating them at this season

of the year. If other cattle in the immediate vicinity are affected, the adult flies will travel far enough to infest neighboring cattle. All cattle owners should unite to destroy this pest.

Treatment. —Treatment should begin as soon as the warbles are noticed upon the animals' backs. Most of the warbles or grubs can be destroyed by putting turpentine, kerosene, crude petroleum or mercurial ointment in or on the opening through the skin directly over the warble. If the opening is very small, it should be enlarged by using a smooth, pointed stick. A machinist's oil can having a slender nozzle furnishes an excellent method of applying the medicine. By running the cattle through a chute they can be treated quite rapidly. They should be examined in about ten days, and any that escape the first treatment should be destroyed by a second; or better, squeezed out and crushed; or they can be crushed beneath the skin by pinching the lump, or killed by inserting a pointed wire or large blunt-pointed needle. It is important that any grubs squeezed out or escaping naturally should be destroyed or they will transform into adult flies.

N. S. MAYO.

Press Bulletin No. 132—General Department.
July 19, 1904.

The Common Garden Mole.

(Scalops aquaticus machrinus, Rafinesque.)

The Common Garden Mole, *Scalops aquaticus machrinus* Raf. (Synonym *S. a. argentatus* Aud. and Bach.) is abundant over all the cultivated portions of eastern and middle Kansas. In spite of a continual warfare upon them by the owners of the lawns and gardens, they are undoubtedly rapidly increasing in numbers, especially in the vicinity of towns and farm buildings. In these places they find the cool, moist soil under sidewalks and in the shade of buildings and trees where their food is most abundant. Here, too, they find places of safe retreat from their chief enemy, man.

Moles have few natural enemies. As they seldom come to the surface of the ground, they do not readily become the prey of cats or predacious birds. Their eyes are rudimentary, but enable them to distinguish the presence of light, so that when they accidentally come to the surface of the ground, they immediately make an effort to burrow into the soil again. Their food consists chiefly of earthworms and insects that live in the ground. The presence of moles in large numbers at any place is an evidence of the abundance of their food, and there is no doubt but that they do much good by destroying many noxious insects, especially

the larvae of Lachnosternidae (May and June beetles.) If it were not for the injury done to the lawns by their throwing up ridges of earth along which the grass dies, or to gardens by their loosening the roots of young plants, moles would be more beneficial than harmful. Aside from the destruction of insect pests, they stir the soil in corn and alfalfa fields in a beneficial way. They seldom eat grains of newly planted corn. Much of the damage in this direction, so often attributed to moles, is really done by species of mice that follow in their run-ways. It is also true that moles sometimes kill young plants and trees by cutting off their roots just below the surface of the ground, but this is not by way of getting food, but solely because the roots are in the way of the animal's progress.

Prof. L. L. Dyche, of the University of Kansas, has published the results of a careful study of the food of the mole. Sixty-seven specimens taken in the various months of the year, except December and February, were examined, and food was found present in the stomachs of fifty specimens. Of the total food present, earthworms comprised 43.2 per cent; ground beetles, 22.7 per cent; grubs and larvae, 22.8 per cent; vegetable matter, 3.7 per cent; other materials, largely insect eggs and ants, 7.6 per cent.

Experiments in destroying moles have been made by the writer during the past three seasons with varying success. The poisoning experiments were made with much doubt as to the character of the results that would be attained, owing to the great difficulty in finding suitable baits. Strychnine, the poison which proved most successful in destroying rodents, was assumed as the best adapted to the work.

With shelled corn soaked in a solution of strychnine and syrup, some of the moles were killed, but no data as to the relative number could be obtained.

With sweet corn in the milk or roasting-ear stage, cut from the cob and similarly treated, a large measure of success was attained and nearly all the moles destroyed.

The kernels of unroasted peanuts, in which strychnine crystals were placed, were found to be reasonably successful bait, and are recommended when green corn is not available.

Bits of meat or dead insects properly poisoned will prove successful, but with the meat there is great danger of poisoning dogs, since the mole burrows lie close to the surface of the ground.

The sense of smell seems to be strongly developed in moles. My experiments have verified the statement that if ordinary mothballs are dropped into their run-ways and these covered, the moles

will not again use them until the moth-balls have entirely disappeared. This does not, however, prevent their working in nearby places.

Traps for catching moles are sold in most of the hardware stores. Nearly all of them work by the use of a spring coil which, when released, drives a number of sharp tines into the ground and through the mole. Some experience in setting these traps will lead to the best results; but trapping is a much slower process than poisoning.

Moles are usually actively at work in the early morning or late in the afternoon. At times there is also a short period of activity about noon. It is not difficult to kill them with a pitchfork when they are working, the animals being located by observing the movement of the ground above them.

If water is allowed to run into the burrow and fill it, the animal when present can be forced to come to the surface to avoid drowning, and may be easily killed. The writer at one time killed a female and six young at one such operation.

The best remedy for the damage done to lawns and grass-plots by moles is prompt rolling with a heavy roller. By continued repetition of this the moles will be driven away, at least temporarily.

D. E. LANTZ.

Press Bulletin No. 133—Entomological Department.
August 16, 1904.

Grasshopper Poisons.

Numerous complaints now reaching the Kansas Experiment Station, through correspondence from various counties in the alfalfa growing sections of the State, show the destructive presence of locusts or grasshoppers in the fields of that important crop, and make timely the publication of suggestions for the repression of these insects. It should be stated at the outset that the locusts that are responsible for the reported damage are in no case the much discussed migratory sorts, especially the so-called Rocky Mountain Locust, but they are well-known native species, common throughout the Mississippi valley as well as throughout the states of the plains. They are found throughout their range wherever the herbage is rank and vigorous, and mass in the weeds and grass of the fence rows and on the borders of cornfields everywhere. Their particular destructiveness in the alfalfa regions is due to the lack of suitable pasturage for them in the surrounding unirrigated lands, from which they collect on the more acceptable growth of the hay fields.

As in these regions there are practically no natural checks to their increase that may be regularly depended upon, it is desirable at the present time to destroy them as far as possible, not only to limit their present depredations, but also to insure greater immunity from future attacks by the destruction of the breeding insects. They will soon be busy in depositing eggs abundantly in the fields where they are now eating the crop, and it is by all means desirable to kill them off before this next step in their economy is accomplished.

Two methods commend themselves to farmers in the regions infested. One of these, the use of the "hopper-dozer," or catching pan, is not so well adapted to the capture of the insects at this, their winged stage, as it is earlier, before they have acquired wings. It may be stated that the use of this contrivance, the catching pan, is recommended after abundant practical experience with it by some of our western farmers, and is by no means to be undervalued, especially if employed on the young locusts soon after hatching, and before they have spread widely from their hatching grounds.

At the present stage of growth of the insects, however, the most practical mode of destroying them is by the use of poisoned baits, scattered through the fields where the locusts are most abundant. One formula employed successfully in some western localities is a modification of the well-known bran bait for plant-feeding insects in other orders, and is as follows: 100 pounds of bran, 8 pounds of sugar, 1 pound of saltpeter, and 4 pounds of paris green. Dissolve the sugar and saltpeter, then add the paris green and enough water to moisten the bran well, but not so wet as to destroy its slight adhesiveness, and scatter the bait broadcast, or deposit in small masses in places where the locusts are thickest.

As a much cheaper mixture or bait, it is recommended that a thorough trial be also made of a formula that has come to us from Manitoba, where it is said to have displaced the earlier mixtures. It is there called the Griddle mixture, from the name of the inventor, and is as follows: 1 part paris green, 2 parts salt, and 40 parts horse dung, by measure, the whole to be well mixed with water till soft, but not sloppy, and scattered over the infested places. It is said to have the merit of attracting the insects for a considerable distance, and while most effective when fresh, it will retain its poisonous quality even when several weeks old.

E. A. POPENOE.

Press Bulletin No. 134—Fort Hays Branch.
July 23, 1904.

Baby Beef.

A considerable amount of feed having been grown at the Fort Hays Branch Station during the season of 1903, a feeding experiment was authorized. The feeds are those which can be grown on nearly every farm in this section of the State. At the time the experiment was planned, eighteen months had not yet elapsed since the first sod was turned at the Branch Station. Owing to the scarcity of labor, the feed lots were not completed until December, 1903. The calves were grade Hereford and Shorthorn, the former predominating, and were eight to ten months old when put in the lot. The lots are on well-drained ground, 66x300 feet each, inclosed by woven-wire fence. Each lot has a shingle–roofed shed open to the south, and good, clean water in a tank near it.

The 56 head of calves were carefully sorted and weighed so that the lots were made as nearly alike in quality and weight as possible. On December 21, after having been weighed on three consecutive days, they were put on feed. The feeding was begun at one pound of grain and ten pounds of roughage per day for each animal. This was increased gradually for more than two months before the lots were getting all the grain they would eat. The roughage was reduced as the quantity of grain increased. After they were feeding up to the limit, they were given just what they would clean up twice daily. The grain and hay were carefully weighed to each lot at every feed. The grain was all medium-finely ground and the lots getting corn were fed corn-and-cob-meal until the last three weeks, when they received straight corn-meal. All the feed was of good, ordinary quality and grown on the Station farm.

The experiment continued 183 days, ending June 21, 1904. The following table shows feed and results of the seven lots:

Lot and Feed.	Average weight at beginning.	Gain per head.	Daily gain per head.	Feed to make 100 pounds gain.		No. in good marketable condition.
				Grain.	Hay.	
1. Corn and Alfalfa	399	338	1 85 lbs.	545	388	8
2. Barley and Alfalfa	401	297	1 62 "	519	421	6
3. Wheat and Alfalfa	413	284	1 56 "	404	432	6
4. Corn and Sorghum	397	224	1 23 "	715	592	4
5. Corn and Prairie Hay	406	262	1 43 "	641	381	5
6. Corn and Oats Straw	405	251	1 37 "	717	354	4
7 Mixed Feeds*	403	328	1 80 "	473	414	7

*One-third each of grains and one-fourth each of different hays.

There was a more marked difference in the appearance of the lots than the results show, though the rank would be in the same

order as the daily gains. The alfalfa lots fed much more evenly than the sorghum, straw, or prairie-hay fed lots, hence would have brought a better price on the market. It had been expected that all the lots would be sold on their merits, but as a few head in several of the lots were not in first-class condition, only part of these were sold. Thirty-six head were shipped to the Kansas City market. They averaged 694 pounds and brought five cents on a steady market, netting $33 per head. When bought for the experiment, the 56 head cost $13 each, or $3.22 per hundred weight.

In the table that follows, the feeds have been given approximate local prices, i. e., corn 40 cents, wheat 65 cents, and barley 40 cents per bushel; alfalfa $4, prairie hay $3.50, sorghum $3.50, and oats straw $1 per ton.

LOT NUMBER.	Weight when bought.	Cost of lot.	Value of feed.	Lot weighed at close.	Selling value.*	Value of lot.	Gain per lot.
1	3193	$102 91	$97 10	5900	$5 25	$309 75	$109 74
2	3206	103 33	118 66	5583	5 00	279 15	57 16
3	3305	106 52	119 07	5410	5 00	270 50	44 91
4	3178	102 28	94 16	4967	4 50	223 51	27 09
5	3251	104 78	92 24	5347	4 75	253 98	56 96
6	3236	104 30	88 35	5243	4 50	235 93	43 28
7	3220	103 78	118 69	5707	5 00	285 35	62 88

*From a study of the market at the time the 36 head were sold, it is thought that the lots would have sold for the price indicated.

A detail record of the labor for the 183 days' feeding was kept, from which the following extract is taken:

One man, 3 3/4 hours daily, for 183 days @ 12 1/2 cents per hour.	$85.75
One man, with team 2 1/3 hours daily, 183 days @ 25 cents per hour,	106.75
Grinding 1426 bushels grain @ 1 cent	14.26
Total	$206.76

An additional item of expense would be 243 pounds of salt consumed by the calves, its value not considered in the above table.

J. G. HANEY, Superintendent.
O. H. ELLING, Foreman.

Press Bulletin No. 135–Veterinary Department.
February 21, 1905.

Ring-bone and Spavin.

Since olden times the terms "ring-bone" has been used to indicate an enlargement around the coronary joint. This enlargement is hard, being a growth of bone, and in many cases forms a complete ring, hence the name. A ring-bone has a tendency to continue growing, and in rare cases attains the size of a man's head.

Causes.—Any conditions which favor sprains, such as fast driving over hard or uneven roads, unequal paring of the hoof, thus causing the weight to be unequally distributed in the joints, and

severe labor in early life. In addition to these may be mentioned blows, bruises, or any injuries to tendons, ligaments or joints. There is no doubt that colts inherit a predisposition to ring-bones.

Symptoms.—Just as soon as the covering of the bone is bruised a liquid is poured out in the region of the injury. This inflammatory liquid hardens and forms the uneven growth known as a ring-bone. If the covering of the bone continues to be inflamed more growth is formed. Before the ring-bone has become chronic the disease passes unnoticed. If the abnormal growth of bone is between the bones of a joint or if it tends to injure ligaments or tendons, when they are moved, a ring-bone is very painful. On the other hand, a ring-bone may be very large and not cause very much annoyance, from the fact that it may not interfere with the free movement of ligaments or tendons or encroach on the gliding surface of a joint. In addition to the growth that can be readily seen, a horse affected with ring-bone is very lame when first taken out of the barn, but after moving for a few hundred yards gradually "works out of the lameness," as horseman call it, but when allowed to stand and become cool and is then moved again, the lameness reappears.

Treatment. —Preventive treatment consists in keeping horses' feet trimmed properly, not overworking colts while young, careful driving on hard and uneven roads, and avoiding all injuries that are liable to strain tendons, ligaments and joints of the limbs.

Even after a ring-bone has developed it may be cured by proper treatment of the feet, and applying a fly blister. The fly blister is prepared by mixing thoroughly one ounce of pulverized cantharides, one ounce of biniodide of mercury and eight ounces of lard. The hair is clipped over the ring-bone and the blister applied with considerable rubbing. The horse's head should be tied so as to avoid his biting the part blistered. A second application of the blister is to be used about a month after the first. If blistering fails to cure the ring-bone, point-firing may be resorted to. It is necessary to "fire" rather deeply to secure good results, care being taken not to fire into a joint. After firing, a fly blister should be rubbed into the holes where the hot iron has been used.

When all these methods have failed and the animal is not worth keeping for a long and uncertain treatment, a skilled veterinarian should be employed to perform an operation for the removal of the nerves supplying the limb in the region of the ring-bone. After a horse has been operated on, great care should be taken of his feet, from the fact that there is no feeling in the foot operated on and

serious results may come from stepping on nails, etc., and carrying them for many days before the driver would notice the foreign bodies.

SPAVIN.

This disease, known in common language as bone-spavin, is an enlargement of the hock joint similar to a ring-bone about the coronary joint. It may affect the hock joint in such a way as to cement the small joints together, not causing lameness and apparently no blemish, but the free movement of the limb is impaired.

Causes. —In addition to the causes given for ring-bone may be mentioned sprains caused by jumping, galloping or trotting animals faster than they are accustomed to; also straining by starting a heavy load, slipping on an icy surface or sliding on a bad pavement.

Symptoms. —If the patient is examined before any bony growth has developed, inflammation will be detected on the inside of the hock joint at the junction of the cannon bone and the joint. While in the stable the horse prefers to rest the diseased leg by setting the heel on the toe of the opposite foot with the hock joint flexed. In traveling the patient is very lame when first taken out of the barn, but after traveling for a short distance goes sound. The diseased leg is not lifted clear from the ground, but nicks the toe in the middle of the stride, which is very noticeable on a pavement. Like a ring-bone, a spavined horse becomes very lame after being allowed to stand for even a very short time, then moved again.

Treatment. —The treatment for a spavin is the same as for a ring-bone.

C. L. BARNES.

Press Bulletin No. 136–Veterinary Department.
March 7, 1905.

Contagious Abortion in Cattle.

The term abortion is applied to the premature birth of the offspring before full term. It is sometimes known as “slinking,” “casting,” or “losing” the calf. Abortion may be caused by drinking considerable ice-water, eating a large quantity of cold food (frozen roots or green vegetables covered with frost), exposure to rain- or snow-storms or wading in ice-cold water, injuries to the abdomen (as being crushed by a gate, kicks, or being hooked), foods that are easily fermented, also insufficient or very innutritious foods; too close stabling, heavy milking, early breeding, inbreeding, stagnant drinking water, ergoted grasses and smut in the various grains, irritant vegetables, impaction of the rumen and constipation, severe constitutional diseases, direct irrita-

tion of the womb (as in the removal of the ovaries or death of the offspring), and irritation of the kidneys. Whenever abortion of cows cannot be traced to any of the above causes the contagious form of abortion is to be suspected.

Contagious abortion is quite common in this State and frequently causes considerable loss, not only from losing the young but also from the fact that many of the cows that have aborted fail to breed again. Contagious abortion is probably caused by several different germs and is transmitted from one animal to another by contact, by means of the discharge from the cow that has aborted, the afterbirth, dead calf, and from bulls that have served cows affected with the disease.

Symptoms. —Cows may abort any time, but it usually occurs from the third to the seventh month. Occasionally the early symptoms pass unnoticed, but in most cases there is some heat and enlargement of the udder, the vulva is somewhat swollen, and there is a discharge of white or yellowish mucus which is not like the normal transparent material which discharges during heat. After abortion the afterbirth is usuaIly retained, giving rise to a very disagreeable discharge which continues for some time.

Treatment. —All suspected cows should be isolated from pregnant ones, and should any cows abort, the offspring and afterbirth should be burned or buried deeply and the stable thoroughly disinfected by the use of lime on the floor, after all the litter has been removed and burned. Then the wood-work should be disinfected with corrosive sublimate solution, using it in the proportion of one to one thousand. The tablets of corrosive sublimate may be secured at any drug store with directions for use. Ten days after the first disinfection with corrosive sublimate, all woodwork should be disinfected a second time. A week after the second disinfection the entire stable should be whitewashed.

Cows that have aborted should be washed out with a 1 per cent solution of creolin or lysol, continuing this daily until all discharge has stopped. Pregnant cows should be given sodium hyposulphite once daily, in tablespoonful doses, as a drench. When cows abort in pasture, great care should be taken to burn the offspring on the spot where it dropped, and the immediate vicinity should be thoroughly limed.

As a precaution to prevent the spread of the disease in an aborting herd, it is well to disinfect the tails and also the vulva and immediate parts with a 5 per cent creolin solution, to make sure of preventing the entrance of the germ into the womb. Bulls that have been with an aborting herd should not be allowed with

healthy cattle; and to prevent their spreading the disease they should receive the same disinfection advised for cows. Cleanliness and the proper isolation and disinfection of cattle should be strictly adhered to in order to eradicate the disease.

C. L. BARNES.

Press Bulletin No. 137—Veterinary Department.
March 21, 1905.

Some Troubles of Swine.

PARALYSIS OF HOGS.

Within the past year a large number of reports have come to this office from different parts of the State of what appears to be a paralysis of the back and limbs of hogs. The young pigs are the ones most generally affected. The cause has been found to be from over-feeding young, growing pigs on an exclusive diet of corn and water. Fat is put on the pigs too rapidly, with the result that the weak bones of a growing pig cannot support the rapidly-put-on flesh. The first symptoms noticed are that the pigs refuse their feed and walk rather stiffly, continuing to grow worse until they can barely raise themselves upon their front legs. The pigs die of starvation, as they cannot drag themselves to the trough.

Treatment.— To prevent young pigs getting sick, a very small amount of corn should be fed them while nursing their mothers. Then gradually increase the amount of corn. When weaned, feed ground feed of bran, shorts, corn, and a little bone-meal mixed with sufficient milk to make a thin slop.

After young pigs are paralyzed it is best to take all corn away from them and see that they are placed at a trough of milk in which has been stirred bran and the following tonic, which is recommended by the Bureau of Animal Industry as a preventive against hog-cholera and swine-plague, and which is also a very good tonic for hogs:

	Pounds.
Wood charcoal	1
Sulphur	1
Sodium chloride	2
Sodium bicarbonate	2
Sodium hyposulphite	2
Sodium sulphate	1
Antimony sulphide (black antimony)	1

These ingredients should be completely pulverized and thoroughly mixed. The dose of this mixture is a large tablespoonful for each 200 pounds weight of hog to be treated, and it should be given only once a day. When hogs are affected with these diseases

they should not be fed on corn alone, but they should have at least once a day a soft feed, made by mixing bran and middlings, or middlings and corn-meal, or ground oats and corn, or crushed wheat with hot water, and then stirring into this the proper quantity of the medicine. Hogs are fond of this mixture; it increases their appetite, and when they once taste of food with which it has been mixed they will eat it though nothing else would tempt them.

Animals that are very sick and that will not come to the feed should be drenched with the medicine shaken up with water. Great care should be exercised in drenching hogs or they will be suffocated. Do not turn the hog on its back to drench it, but pull the cheek away from the teeth so as to form a pouch, into which the medicine may be slowly poured. It will flow from the cheek into the mouth, and when the hog finds out what it is, it will stop squealing and swallow. In experiments, hogs which were so sick that they would eat nothing have commenced to eat very soon after getting a dose of the remedy, and have steadily improved until they appear perfectly well.

This medicine may also be used as a preventive of these diseases, and for this purpose should be put in the feed of the whole herd. Care should of course be taken to see that each animal receives its proper share. In cases where it has been given a fair trial it has apparently cured most of the animals which were sick and has stopped the progress of the disease in the herds. It also appears to be an excellent appetizer and stimulant of the processes of digestion and assimilation, and when given to unthrifty hogs it increases the appetite, causes them to take on flesh and assume a thrifty appearance. B. A. I.

WORMS IN HOGS.

Hogs affected with worms in the intestines run down in condition, become very thin and lank, back is arched, eyes dull, refuse feed, walk stiffly and appear lifeless. The worms may be very numerous, in bad cases completely filling the intestines. The pigs die if not treated. To secure the best results, affected hogs should receive individual treatment. Twenty-four hours before administering treatment very little feed should be given them. Then give the following medicine as a drench, to each one-hundred-pound hog; larger or smaller hogs should receive a dose in proportion:

Oil of turpentine	4 drachms
Liquor ferri dialysatus	½ drachm
Raw linseed oil	6 ounces

If necessary, repeat the dose in four days. After worms have been removed, give the tonic recommended above, to put the pigs in condition.

TUMORS ON PIGS AFTER CASTRATION.

Causes.— Bunches form on the cords of pigs after castration as a result of infection from dirty instruments or hands, etc., during the operation or from leaving the cord too long, thus increasing the liability of its becoming infected. These tumors continue to grow, and in the worst cases attain the size of a man's head.

Treatment.— Cut down on the tumor the same as in a simple case of castration. Separate the skin from the tumor and then follow up the cord with the hands. Cut the cord off as high up as possible. The wound may be healed by the use of any of the common disinfectants. A teaspoonful of carbolic acid in a quart of water may be used once daily until the pigs are healed. Pigs should be kept in a clean pen after the operation.

C. L. BARNES.

Press Bulletin No. 138—Farm Department.
March 28, 1905.

Testing Seed-corn For Vitality.

During the past winter the State has experienced a heavy fall of snow with extremely cold weather following, and the question has been asked whether this would materially affect the vitality of the corn, especially that stored in cribs or somewhat exposed. In order to learn the facts as regards the above question, and also to ascertain the average germinating power of the seed-corn of the State, and to determine if possible some of the prevailing causes of low vitality, the Farm Department of the Kansas Experiment Station has undertaken to test samples of corn received from farmers from various parts of the State. It was requested that about twenty ears be selected which represented as nearly as possible the conditions of the crib or of the whole bulk of corn, and that four or five kernels be taken from different parts of each ear, making a germination sample of about 100 kernels. These samples, after notes were taken as to their apparent vitality, were placed in a germinator under like conditions. The results as given in the table below are based upon the germination of 58 samples.

	Number samples tested.	Average per cent germinated by the fifth day.	Average total per cent germinated.
Shock Corn	7	78.9	82 0
Crib Corn	31	87 1	92 2
Well-stored Seed-corn	6	94 3	99 0
All of samples tested	58	89 7	91 8

While the samples varied in vitality from 31.6 per cent in one sample of shock corn to 100 per cent in several samples of crib corn and well-stored seed-corn, it would seem from the average results as given in the above table that the vitality of the corn of the State is as good as may usually be found, and that the snow and cold weather has done little injury to the vitality. It was not expected that the weather conditions would have much effect upon the well-stored corn, or upon the crib corn which was well protected, and it is probable that in exposed cribs very little of the snow melted so that the corn would absorb the moisture before the cold weather commenced.

While it may seem to some that each grade of corn has shown a good average germination, it is by no means all that could be desired. The percentage of germination by the fifth day as secured in the laboratory should be accepted as the true germinating power rather than the total percentage, as it is probable that the corn which germinated later than the fifth day would not germinate in the field except under favorable conditions, or would produce weak, undesirable plants. Of the shock corn, 78.9 per cent showed a satisfactory germination as compared with 87.1 per cent by the crib corn, and 94.3 per cent by well-stored corn. These percentages are all so low that the progressive farmer should not be satisfied with them. It has been shown by germination tests that kernels from the same ears are apt to have the same vitality, while different ears from the same sample may vary widely in germination, hence if each ear which is desired for planting is tested separately the ears showing low vitality may be discarded, thus seed may be secured all of which will grow. As this is a simple operation it doubtless would pay the farmer to make such a test each year. A very satisfactory way to do this is to carefully select the seed ears, place them on a shelf or table, and after tagging and numbering them select a half-dozen kernels from different parts of each ear, and wrap these separately in a sheet of absorbent paper (about 6 x 10 inches), and marking on each paper the number of the ear. Then after thoroughly wetting, place these samples in a cigar box or some fairly tight re-

ceptacle which will retain the moisture, and set in a warm room. If the paper becomes dry, add a little water until thoroughly moistened again. If one or more kernels in any wrapper fail to germinate, or if the kernels germinate slowly, the ear from which these are taken should be discarded.

The well-stored or selected seed-corn showed the strongest vitality, 94.3 per cent on the average germinating by the fifth day or 99 per cent germinating in all.

A fair illustration of what good storage may do is seen in two samples of corn received from Mr. W. R. Hildreth, of Altamont, Kan., the sample from the crib germinating 85 per cent by the fifth day and 86 per cent in all, while the other sample of this corn selected in the fall and kept in the house germinated 100 per cent by the fifth day. Although as an average for all samples, the well-stored corn did not germinate as well as it should have done, yet a comparison of the average germination of the different grades gives us an indication of the importance of carefully selecting, drying and storing corn for seed purposes.

Practically all the samples received were reported to have been well matured before being placed in storage, so that little opportunity was afforded to study the effects of maturity on the vitality of the corn. However, many experiments have shown that lack of maturity is one of the most common causes of low vitality. The seed-corn should be selected fairly early in the fall, so that only well-matured ears will be chosen. If all the corn is well matured the selection should still be made in the fall, as it will be possible to make a better choice then, since the selection may be made from all the corn rather than from a comparatively small portion of it which may remain in the crib in the spring, and also when the selection is made in the field the whole plant may be studied as to uniformity, productiveness, and other desirable features. The selected ears should preferably be stored in a dry and well-ventilated room, which may be heated artificially as cold weather approaches, if this seems necessary, in order to dry the corn thoroughly before freezing weather. If the corn is not well matured this precaution is more necessary. Well-dried corn will not be injured by cold weather provided it is kept in a dry condition.

Late in the winter or in the early spring a further selection of this corn should be made, and only that which upon careful inspection is found to conform most nearly to the desired type should be chosen for planting. It is probable that some of these choice ears which have been kept under favorable conditions will be of

low vitality, and hence they should be tested as described above. This work of picking out the best of the seed ears and testing the vitality of the same is a simple operation after the details of the test are once understood, and requires only a few hours work at a season of the year when a farmer may readily spare the time. There is no doubt but that this work will be well paid for in the average season in the better quality and increased production of the corn crop.

V. M. SHOESMITH.

Press Bulletin No. 139—Veterinary Department.
April 11, 1905.

Garget (Congestion of the Udder.)

Garget is a disease of the udder usually affecting heavy milkers. It may occur at any time of the year, is not confined to any particular locality, and is not contagious. The udder being a very highly organized gland, any condition which affects the general health of the cow is very apt to involve this structure and show itself in the form of gargety milk. It frequently happens that a cow is affected with garget or gives bloody milk at more or less irregular intervals. Such animals should be examined by a competent veterinarian, as it is quite likely that the animal has some special disease of the udder, such as tuberculosis or actinomycosis. In that event the milk would be considered unfit for food, even during the apparently normal condition of the animal, though it may look perfectly healthy. The germs might be present in the milk and transmit the disease to other animals using it. The presence of these germs in the milk could be demonstrated only with the microscope.

Causes.— Injuries (blows on the udder with stones, clubs, feet, or horns, from projecting nails, or edge of boards, sharp or cold stones); exposure to sudden and extreme changes of weather; over-feeding on rich food, such as cottonseed, peas, or beans; indigestion; sores on teats, or insufficient stripping of the udder; it also frequently happens that a newly born calf cannot drain the udder completely; overstocking of udder for an entire day or more with a view to making a show of this organ for sale purposes.

Symptoms.— Usually, the first that is noticed is the condition of the milk, which is watery, colored with more or less blood, and containing a clotted, stringy substance (casein). This is frequently followed by a white pus-like fluid and, in many cases, a very offensive odor.

In Severe Cases the first symptoms to be noticed are first a chill, with horns, ears and limbs cold. This stage, which lasts from a

few minutes to hours, is followed by a period of fever in which the horns, ears and limbs become unnaturally warm and the udder is hot, swells, and becomes more or less solid in one or more quarters. The muzzle is dry and hot; the temperature of the animal is raised, the pulse is full and rapid; the breathing is quickened. The cow has little or no appetite, and she does not chew her cud. The bowels are more or less costive. The amount of milk is lessened and the flow may be entirely absent in the affected portion of the udder.

In Mild Cases many of these symptoms cannot be recognized and the first ones noticed are the swelling, heat and tenderness of the udder. If the trouble grows worse the tenderness causes the animal to straddle with its hind legs. If the cow lies down she will lie on the well side. The above troubles may disappear in a few days and the udder resume its normal condition. If not, it changes into a chronic form in which the symptoms partially subside. The result is, the udder, or the affected part of it, becomes dry or forms abscesses. In the case of drying up the parts may become hard and remain so permanently or only until the next time of calving. If abscesses are formed they should be opened by a competent person and properly treated. Should infection take place at any time (the entrance of disease germs into the affected part) the result may be serious and may even cause the death of the cow.

Treatment. — The treatment will depend upon the severity of the case and the stage in which the disease is discovered. If the animal is cold, two ounces of ground ginger given in a pint of warm water, or any hot drink, may cut short the attack. This must be given from a horn or bottle. Blanket the animal and rub her limbs with whisps of straw, making her as comfortable as possible. Moist heat should be applied to the udder by using heated wheat bran in bags, held in place by strips extending over the loins, between the hind limbs and around the abdomen.

Should the udder be very painful and the animal feverish, fomentations of hot water, as hot as the attendant's hand can comfortably bear, should be applied for several hours, for about fifteen minutes at a time. This may be done by passing a sheet around the body with four holes cut for the teats and soft rags or bran packed firmly between it and the udder. After the fever has subsided, drench the animal with one or two pounds (depending on the age, size, condition and strength of the cow) of Epsom salts with two ounces of powdered ginger in a sufficient amount of water. When the purging has ceased, one ounce of saltpeter may

be given daily. The udder will need constant attention for some time in the way of gentle rubbing with camphorated oil, several times daily; at the same time gently removing all the milk by squeezing the teat instead of pulling or stripping it. If this causes the animal too much pain, a teat tube may be used but must be boiled thoroughly for five minutes each time before using. When the udder is not tender, thorough hand rubbing several times daily, with or without the camphorated oil, will aid in bringing about a normal condition. F. S. SCHOENLEBER.

Press Bulletin No. 140—Dairy and Animal Husbandry Department.
May 16, 1905.

Kansas Experiment Station Egg-Laying Contest.

The records of the egg-laying contest, arranged by the Kansas White Wyandotte Club and conducted by the Dairy and Animal Husbandry Department of the Kansas Experiment Station, has been completed for the first half of the year.

The fowls in the contest made an excellent egg-laying record, and the results compare favorably with those of previous authentic egg-laying contests. Better performances could probably have been made had it not been for some of the unfavorable conditions which always accompany the carrying on of a contest; as, for instance, the transportation and frequent handling of the fowls, their adaptation to new and strange surroundings and confinement to smaller yards than they had probably been used to, all of which tend to diminish the egg yield. Beside this, the winter was the most severe ever known in the State. However, the houses in which the birds were wintered were built to meet these conditions, but it would have provided more comfortable quarters if a larger number of birds for each pen had been furnished by the club.

The following is the list of competing birds, with notes on their performance:

First pen, Rose Comb White Leghorns, owned by Mrs. Jennie E. Warren, Cottonwood Falls, Kan. — These were fairly well matured pullets. They seemed rather out of condition at the beginning of the contest, but recovered and gave excellent results through the winter. They were not affected by the low temperature as readily as the Single Comb White Leghorns. No. 25 of this pen became sick in the early part of February, the ailment being what is commonly called “going light,” and the pullet died the last of March and was replaced by No. 89 on April 5.

Second pen, Light Brahmas, owned by Mr. F. A. Brown, Onaga, Kan. —These birds have been in the best of condition up to the present time. The small egg production early in the season must be explained by the fact that they are slow-maturing fowls. In this pen and, excepting the Leghorns, in all pens, the egg yield fell during April, owing to the broody condition of the hens. All broody hens were promptly removed to a strange pen to break up this condition, and in ten days were again ready for laying.

Third pen, Barred Plymouth Rocks, owned by Mrs. J. W. Jones, Abilene, Kan. —This pen consists of hens, while all others entered were pullets. This was due to an unfortunate misunderstanding, and is manifestly unfair to the breed, for hens are generally considered to be poorer winter layers than pullets. The hens were inclined to over-fatness and were heavy eaters.

Fourth pen, White Wyandottes, owned by Beecher & Beecher, Belleville, Kan. —These pullets have been in prime condition up to the present time.

Fifth pen, American Reds, owned by Dr. J. Martin, Wichita, Kan.— These pullets were laying when shipped to the College, being the only ones laying at the time. They laid heavily until January 1, 1905, when several of them molted and stopped laying. They are more inclined to broodiness than any other breed in the contest.

Sixth pen, Buff Wyandottes, owned by Mr. G. C. Wheeler, Harlem, Mo. —These pullets have done well up to the present time.

Seventh pen, Single Comb White Leghorns, owned by the Kansas State Agricultural College. —These pullets did well also, but suffered more from the severe cold than any other breed. No. 60 suddenly died April 17, and was immediately replaced by No. 7.

The accompanying table gives the egg yield and the value and cost of feed figured according to local markets. At the close of the year more complete results, including the brooding periods, fertility of eggs and other points of interest, will be published. A study of the table will reveal a surprising difference in the individuality of the hens. This contest should prove much more interesting and instructive than previous contests where no records of individual performance were kept.

ROSE COMB WHITE LEGHORNS.

No.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total	Value.	Feed Cost.	Loss.	Gain.
6		12	18	22	23	17	92	$1.278	$0.439		$0 839
8	3	14	15	5	24	14	75	1 031	.439		592
25		14	14	3			31	.512	.361		.151
68			11	1	19	13	44	.552	.439		113
94		3	5	6	21	21	58	718	.439		279
98	3	16	17	17	23	20	96	1.336	.439		897
89						8	8	.086	065		021
Total	6	61	80	54	110	93	404	$5 513	$2 621		$2.892

LIGHT BRAHMAS.

No.	Nov	Dec.	Jan.	Feb.	Mar.	Apr.	Total	Value.	Feed cost.	Loss.	Gain.
8		4	9	10	23	17	63	$0.81	$0 525		$0 285
18				2	20	12	34	.383	.525	$0.142	
21			10	13	16	10	49	655	525		130
25			2	18	18	15	53	.674	.525		149
54					13	17	30	.327	.525	198	
70					21	17	38	.416	.525	109	
Total.		4	21	43	111	88	267	$3 265	$3.150		$0.115

BARRED PLYMOUTH ROCKS.

No.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total	Value.	Feed cost.	Loss.	Gain.
7	2	15		2	22	11	52	$0.676	$0 527		$0 149
10				2	19	17	38	425	.527	$0.102	
45		14	20	10	24	18	86	1 177	527		650
67					23	13	36	.395	.527	.132	
70					20	13	33	362	.527	.165	
98					18	16	34	.372	.527	.155	
Total	2	29	20	14	126	88	279	$3.407	$3 162		$0 245

WHITE WYANDOTTES.

No.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total	Value.	Feed cost.	Loss.	Gain.
4A4		14		2	23	16	55	$0 689	$0 507		$0 182
4A7					24	17	41	452	507	$0 055	
4C9			19	10	22	13	64	849	.507		342
4C11	2	22	24	19	24	21	112	1.585	.507		1.078
4C12					23	18	41	.449	.507	.058	
B1B					23	16	39	.429	507	.078	
Total	2	36	43	31	139	101	352	$4 453	$3 042		$1 411

AMERICAN REDS.

No.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total	Value.	Feed cost.	Loss.	Gain.
3	15	24	19		19	16	93	$1 369	$0 499		$0 870
6	17	23	10	1	19	13	83	1 222	.499		.723
214	10	12		1	24	17	64	833	.499		334
218			6	3	22	16	47	564	499		065
233	3	23	19	17	22	13	97	1 399	.499		900
340	14	19		2	24	19	78	1 069	499		570
Total	59	101	54	24	130	94	462	$6 456	$2 994		$3 462

BUFF WYANDOTTES.

No.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total	Value.	Feed cost.	Loss.	Gain.
6	.....	20	21	14	21	15	91	$1.293	$0.513	.....	$0.078
12	.....	12	17	16	22	18	85	1.169	.513	.....	.656
14	.....	9	18	2	22	19	70	.930	.513	.....	.417
20	.....	3	16	16	27	14	76	1.016	.513	.....	.503
42	.....	.....	10	19	18	18	65	.857	.513	.....	.344
459	.....	.....	.....	8	.....	.....	8	.124	.513	$0.389	.....
Total	.....	44	82	75	110	84	395	$5 389	$3.078	.....	$2.311

SINGLE COMB WHITE LEGHORNS.

No.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total	Value.	Feed cost.	Loss.	Gain.
3	6	16	3	6	23	21	75	$0.996	$0.437	.....	$0.559
7	.....	.....	.....	.....	.....	5	5	.054	.032	.....	.022
19	.....	5	2	10	21	13	51	.643	.437	.....	.206
21	.....	5	3	4	25	20	57	.688	.437	.....	.251
50	.....	4	6	1	21	19	51	.620	.437	.....	.183
51	8	16	2	12	20	17	75	1.053	.437	.....	.616
60	.....	3	.....	1	21	8	33	.364	.407	$0.043	.....
Total	14	49	16	34	131	103	347	$4 418	$2.624	.....	$1.794

O. ERF AND M. M. HASTINGS.

Press Bulletin No. 141—Dairy and Animal Husbandary Department.
May 23, 1905.

Swine Feeding Test with Sorghum-seed Meal, Kafir-corn Meal, Soy-bean Meal and Corn-meal.

Questions relative to the feeding value of sorghum seed and Kafir-corn are frequently received by the Kansas Experiment Station, and as an aid in answering these inquiries the following experiment was planned and carried out. Forty-eight pigs were divided into four lots of twelve pigs each. Each lot contained six Duroc-Jersey pigs, five Poland-China pigs, and one Tamworth. Their average weight at the beginning of the experiment was 138½ pounds, and average age six months. The rations were as follows:

Lot 1 received ground sorghum seed four-fifths and soy-bean meal one-fifth.
Lot 2 received Kafir-corn meal four-fifths and soy-bean meal one-fifth.
Lot 3 received corn-meal four-fifths and soy-bean meal one-fifth.
Lot 4 received corn-meal alone.

It will be noticed that Lots 1, 2, and 3 were fed rations in which the carbonaceous cereal grains were balanced by soy-beans, which are very rich in protein. Lot 4 was fed a purely carbonaceous ration, as a check, to show the value and need of a balanced ration. Pigs of this age are making considerable growth as well as fattening, and it would be expected that the balanced ration would give better results. Reference to the table shows such to be the case.

TABLE I.—Results in feeding pigs corn-meal, Kafir-corn meal, sorghum seed, and soy-bean meal in comparison.

No. Lot	No. of pigs	Average weight at beginning	No. of days fed	Average weight at end	Total gain of lot	Average daily gain per head	Sorghum-seed meal	Kafir-corn meal	Corn-meal	Soy-bean meal	Total grain	Grain per 100 lbs. gain
1	12	139 16	28	167.91	345	1 02	1612.8	.....	.....	403.2	2016	584.3
2	12	140 00	28	178.33	460	1 37	.....	1612.8	.....	403.2	2016	438 2
3	12	136.66	28	172 91	435	1 29	.....	.....	1612.8	403.2	2016	463 4
4	12	138 33	28	168 33	360	1 07	.....	.....	2016.0	.....	2016	560 0

TABLE II.—Financial statement of results.

	Kind of Feed.	Pounds fed.	Value of feed consumed.		Cost of 100 lbs. grain.
			Value per ton.	Value.	
Lot I	Sorghum-seed meal	1612.8	$12 00	$9 67	$4 26
	Soy-bean meal	403 2	25 00	5 04	
				$14 71	
Lot II	Kafir-corn meal	1612.8	13 00	$10 48	$3 37
	Soy-bean meal	403.2	25 00	5 04	
				$15 52	
Lot III	Corn-meal	1612.8	14 00	$11 29	$3 73
	Soy-bean meal	403.2	25 00	5 04	
				$16 33	
Lot IV	Corn-meal	2016.0	14 00	$14 11	$3 92

From the above table we again note the value of Kafir-corn meal as a feed for pigs, this lot making better daily gains and also producing 100 pounds of gain from a smaller amount of grain than any of the other lots. A comparison of lots 3 and 4 shows the value of the addition of soy-beans to the ration, 100 pounds of gain being produced for seventeen per cent less grain than with corn-meal alone. The sorghum seed produced rather poor results in comparison with the Kafir-corn meal and corn-meal in lots 2 and 3. It took 33 per cent more grain to produce 100 pounds of gain with this lot than with lot 2, and 26 per cent more than with lot 3. However, 1.02 pounds daily for a period of twenty-eight days is a fair gain and in localities where there is a surplus of sorghum seed, for which there is no market, it can undoubtedly be fed to pigs at a profit.

O. ERF.
R. J. KINZER.

Press Bulletin No. 142—Horticultural Department.
June 27, 1905.

Summer Pruning.

From careful experiments made by the Horticultural Department of the Kansas Experiment Station during the past four years it seems that the pruning of fruit, shade and timber trees during the early summer and late spring is more satisfactory and secures better results than pruning done during the dormant season—winter and early spring.

Wounds made before the middle of July have healed rather more quickly than have those made at a later date, but wounds made as late as August 15 have healed very successfully. The danger of loss of sap is less after the tree is well in leaf than from wounds made during winter and spring. This difference is more noticeable in the maples, elms and mulberry than with other species under observation.

In extensive tests made on an apple orchard some very satisfactory results have been secured with ten-year-old trees which had borne but little and showed but few fruit spurs. Trees pruned in the summer of 1902—the pruning consisting of cutting back new wood and thinning out where a heavy growth shaded the two- and three-year-old wood—and a similar but lighter pruning given in the summer of 1903, were full of bloom in 1905 and are carrying a very fair crop of fruit.

Trees pruned in summer have grown fewer "water-sprouts" than those of similar age and grown in a similar soil, pruned in winter or early spring. Water-sprouts removed during summer are less liable to be followed by another crop of the same growth than where the pruning is done in winter.

The operator is less likely to remove a large amount of wood, for he can readily see the danger of sun-scald where too many or too large branches are removed. The thinning out and cutting back of the younger branches should be all that is required when the orchard has had a reasonable amount of care given to its formation, and this light pruning given in early summer seems to be good treatment for unproductive trees. ALBERT DICKENS.

Press Bulletin No. 143—Horticultural Department.
July 4, 1905.

Preparing Fruits for Exhibition.

The number of county and district fairs advertised for Kansas the coming fall suggests that fruit and vegetable growers should be getting the plans for horticultural exhibits under way.

The exhibitor should study carefully the premium lists and note every class in which he can make entries and then get his entries ready. Every fruit and vegetable that is to go on the exhibit table should have the best possible opportunity for development. This will usually require thinning, and sometimes a little pruning in order to give the fruits a chance to color. Every exhibitor must consider his exhibit from the judges' standpoint. While there are at present no authoritative standards, most expert judges have an outline they follow more or less closely. A general plan for all fruits, established by the Massachusetts State Board of Agriculture, is used in its present or a slightly modified form by many judges. It is as follows: Quality, 20 points; form, 15 points; color, 15 points; size, 10 points; uniformity in size, 20 points; freedom from imperfections, 20 points; total for perfection, 100 points.

Nearly all points are considered from a commercial standpoint. The over-sized fruit is not wanted by the markets, and over grown specimens are likely to be cut by the expert judge. Quality is a hard point to handle, especially with fruit not yet ripe, and in such cases is often disregarded or estimated by the form and general appearance of specimens. In competitions of storage fruits, however, it is of special importance. Uniformity of specimens is a most important matter. Fair-sized fruits of even form and color of the proper type make good plates. They show to much better advantage than uneven specimens. Freedom from blemishes should be insisted upon. A fruit injured by insect, disease or accident is not marketable and deserves a hard cut. Some older judges disqualify such fruit from the competition.

Fairs should be educational in character. Those who attend should see only good specimens, such as the world markets want, if they are to be benefited by their attendance. The grower should know what is wanted, and if he does not, the fair may be a valuable school for him. ALBERT DICKENS.

Press Bulletin No. 144.—Entomological Department.
July 4, 1905.

The Garden Web-Worm.

Much complaint has reached the Kansas Experiment Station within the last month from the middle and eastern sections of the State concerning the destructive abundance of the small, green, black-dotted, web-spinning caterpillar known as the garden web-worm, which has in many cases cleaned out, and in most others

severely injured, fields of sweet potatoes, corn and alfalfa in the region named.

The impression that this insect is new, and that it may increase in the future to do greater damage, is unfounded, as the species has been common locally, in occasional years, for many years past, its present general abundance being no doubt due to some not discovered favoring climatic condition. Past experience leads to the belief that it will be noticeably destructive neither during the remainder of this year, nor during the earlier months of next. It is attacked by several species of parasites, and seems susceptible to disease, being checked in development during wet, and favored by dry weather.

In seasons of its normal abundance, it feeds almost entirely on certain common field and garden weeds, notably on the species of pig-weed, and lambs-quarter, so called. It passes readily from these to garden beets, peas, and sweet potato plants, however, the eggs being laid near the ground by the parent moth, and the caterpillars apparently being found only on leaves not over ten inches from the soil. The time required for the growth from egg to moth is about one month. A second brood of the worms may be expected during August, but the forward state of the crops, and the abundance of their more natural food plants, the weeds above named, ensure that their presence will be little noticed.

As the worms are about half grown before their attacks are perceived, it is commonly a matter of expense and little profit to attempt remedial measures except in special crops or among garden plants. As abundantly proven by trials here, the insects are very easily killed by an application of the arsenical poisons, in a spray in water, which must, however, be made in such a manner that the liquid will be forcibly thrown through the web, reaching the plant surface underneath on which the worm feeds. An ordinary light spray will have little effect, and may give rise to the unwarranted conclusion reached by one correspondent, that "the worms fatten on paris green."

Unless very young at the time of attack, corn will commonly recover, the heart of the plant not usually being eaten by the worm. Alfalfa will also easily make new growth, and little damage will probably result to the plant itself. Sweet potatoes, unless strongly rooted, are often largely killed, and with them replanting immediately seems to be the most satisfactory treatment.

E. A. POPENOE.

Press Bulletin No. 145 – Entomological Department.
July 18, 1905.

A Shade-Tree Pest: The Fall Web-Worm.

Shade-trees on lawn, park and street are now subject to attack by dark caterpillars about an inch and a quarter long, covered with long, white hairs, and spinning, for the protection of the colony in which they live, a dirty, white, silken web, covering, when fully developed, the entire terminal portion of the branch infested. This insect is the fall web-worm, known for many years as a tree pest in lawn and orchard, but more abundant and attracting more attention than usual last year and this.

Observations by the Kansas Experiment Station establish the fact that for this region the insect is two-brooded, and hence more troublesome than in states farther north where but a single brood is matured in a season. Its life history is in brief as follows. The parent insect is a white moth about an inch in extent of wings. It appears in April and May from pupae which have passed the winter under rubbish and in loose soil at the foot of the trees on which the caterpillars of the preceding autumn had fed. These moths, which are night fliers, fly, after mating, to the trees and lay eggs in clusters on leaves mostly in open spares and at the tips of the branches. The young caterpillars are social, and remain for most of their growth in the colonies hatching together. On hatching, they at once begin to spin webs for protection, and as the worms grow and extend their feeding grounds the webs are extended to correspond until they attain the size of a foot or considerably more in dimensions, depending upon the size of the colony. The first attacks merely shred the leaves, but later the entire leaf is eaten, and while at the time of the attack of the more abundant fall brood the tree is so far matured that no great injury to its vigor results, the presence of the worms is very disagreeable, especially when, as nearly full grown, they begin to crawl more widely, scattering over trunk, and neighboring porches, fences, and walks. The mature caterpillars descend the tree and hide under matted leaves or other rubbish, or in hollows and crevices, or in the loose soil to the depth of an inch or thereabouts. Here they enter the dormant pupa stage in which they remain until the latter part of July or the first part of August, when they change into moths. These soon after lay eggs, as did the earlier brood, and unless the first brood of caterpillars was greatly reduced by disease or parasites, the August brood is vastly more numerous and proportionally destructive. In one summer colony over six hundred moths matured. Others are almost entirely destroyed

by parasites, of which there are two forms. Two-winged flies, much like house flies in general appearance, are abundantly bred from some colonies. Four-winged flies known by the general name of braconids or ichneumon flies are, however, more widely effective, and are frequently reared in great numbers.

The late generation of caterpillars have habits like the earlier except that, entering their dormant state later in the season, they remain therein until the next spring, when they hatch into moths by which the eggs for the early colonies are deposited.

Most common shade and orchard trees are subject to the attacks of these pests. They are specially fond of elm, box-elder, hickory, ash, apple, and plum, but scattered colonies occur in various other trees.

Owing to their hatching in dense colonies, it is comparatively easy to check their multiplication and prevent the appearance of the disgusting webs by destroying the caterpillars when young. They are mostly to be sought for at the tips of the branches toward the open, and when discovered they may be removed for destruction, or destroyed where they occur. In the the latter case a kerosene torch will cook them with little injury to the branch, or a spray of arsenical poison may be applied. These methods should be repeated if necessary, and may also be employed in the destruction of the colonies after they have grown larger, but with correspondingly greater expense and trouble. The pupae may be found sometimes many together in attractive situations about the trees subject to attack, and their collection may be made so effective as to greatly lesson the annoyance incident to the presence of the following brood.

Bands about the trees are absolutely of no avail against the attacks of this insect, as the female is amply winged, and uniformly reaches by flying the leaves on which she deposits her eggs.

E. A. POPENOE.

Press Bulletin No. 146—Fort Hays Branch.
August 15, 1905.

Testing Winter Wheat Varieties for Western Kansas.

The Fort Hays Branch of the Kansas State Agricultural College Experiment Station receives numerous inquiries regarding winter wheat. The threshing of 300 acres has just been completed. This acreage includes “Rotation Experiments,” “Time of Plowing,” “Seed-bed Preparation,” and “Cultivation” tests, and plats for seed increase. These plats range in size from only a few hills of

newly selected types in the variety garden to forty-acre plats on the rotation field.

The comparatively large annual wheat sales of the West; the adaptability of the soil and climate to the growing of this cereal; the flour-milling industry and transportation facilities which are being developed in the State, demand our attention toward the improvement of this crop.

The varieties and strains that will yield the greatest value per acre to the farmer and produce the best flour is perhaps a question of as much importance as the question of proper tillage, though the two should go hand in hand.

This Station is experimenting with 380 different varieties and types of wheat, with the hope of establishing new ones that will prove to be more hardy and better adapted to the semi-arid portions of the West. Nearly one-half of these varieties were received from the United States Department of Agriculture, among them being thirty hybrids. In many cases an awnless variety has been crossed with a bearded sort, the off-spring of which show all gradations from the awnless parent on the one extreme to the bearded variety on the other. These various gradations are separated into types, or races, from year to year and grown on small plats for the purpose of originating new varieties that will produce better yields. The following table gives the yields of twenty-six varieties for 1903, 1904, and 1905, with the average for the three years. They were grown side by side on the same field, in one-acre plats. Each plat was given precisely the same treatment, and seeded in the same manner and at the same rate per acre, so that any variation in yield is due to the hardiness of the variety:

No.	Variety.	Yield, bushels per acre.			Av. for 3 years.
		1903.	1904.	1905.	
1..	Common Turkey	38.75	10.23	4.30	17.76
3..	Imported Turkey	39.10	10.13	5.80	18.34
4..	Kharkof	40.90	11.75	4.70	19.11
5..	Beloglina	38.24	9.16	5.23	17.54
6..	Ulta	36.35	10.36	4 81	17.17
7..	Crimean	40.61	10.23	4.00	18.28
8..	Ghirka	35 88	8.40	3.35	15.81
9..	Padui	19.88	3 04	2.21	8.37
10..	Yaroslav	6.44	2 48	3.91	4.27
11..	Crimean	29.20	4 46	4 93	12.86
16..	Crimean	37.09	10.59	5 53	17.73
28..	Crimean	36 18	8.53	4.97	16.56
29..	Crimean	33.15	10.78	5.94	16.60
30..	Ghirka	28.44	9.00	5.60	14.34
31..	Ulta	37.76	10.18	5 80	17.91
32..	Padi	18.06	3.43	4.70	8.73
33..	Kharkof	35.28	10 12	6.30	17.23
34..	Turkey	34.84	9 56	5.49	16.63
35..	Crimean	36.27	11.13	4.73	17.38
36..	Banat	36.91	11.40	4 15	17.50
37.	Theiss	40 97	9.16	4 50	18.21
38..	Bacska	36.40	10 16	5 08	17.21
39..	Weissenberg	39 52	11 02	7.02	19.18
40..	Pesterboden	36.59	8.05	5 60	16.75
41..	Padi	24.29	2 95	3.80	10.23
42..	Kharkof	39.50	24.18	4.76	18.78

The season of 1902-'03 was an exceptional one for wheat. The winter was very mild and the spring moist, and no marked effects from rusts or smut. On the whole, the season was very favorable for large yields, but not typical of the conditions a profitable variety must be able to withstand in this section.

In 1903-'04 the season was not so favorable as the preceding one, the rusts cutting the yield at least 40 to 50 per cent.

Extreme dryness of the entire season of 1904 -'05, and the continuous high, dry winds just at the time the grain was filling, accounts for the low yields. And further, in 1902-'03 the trial was conducted on bottom-land, while in the two succeeding seasons it was on the highest of the Station upland.

The Russian varieties—Kharkof, Beloglina, Ulta, Yaroslav, Ghirka, and Padi—present a great variation in yield. The Kharkof varieties gave the best yields, while the Padi and Yaroslav the poorest, and the quality of the latter was much inferior to all other varieties. Of these varieties named, the Kharkof seems best adapted to this section of country, our No. 4 Kharkof being one of the best yielders.

The Hungarian varieties—Banat, Theiss, Weissenberg, and Pesterboden—are quite promising. They yield well and the quality of grain is good.

The Crimean varieties, whose original source is nearly the same as the Turkey wheats, are not quite equal to the latter in the West. The Turkey takes the lead both in yield and quality of grain.

The accompanying table gives data for 1905, of the varieties that have proved promising in the Variety Garden, and are being increased for field tests:

No.	Variety.	Area.	Date Planted.	Germination.	Date ripe.	Yield bu. per acre.
12	Native awnless wheat	⅛A	Oct. 6	95	June 21	6 58
14	From U. S. Dept. Agr	⅛A	Oct. 6	95	June 23	7 50
20	Beloglina	⅛A	Oct. 6	95	July 1	7 25
23	From Missouri	⅛A	Oct. 6	90	July 1	7 62
24	From Japan	⅛A	Oct. 6	97	June 27	7 41
44	No. 2 Weissenberg X Currell	⅛A	Oct. 6	98	June 23	8.29
45	Turkey X Theiss	⅛A	Oct. 6	95	June 23	9 50
46	Pesterboden X Currell	⅛A	Oct. 6	95	June 23	13 50
59	Banat X Turkey	⅛A	Oct. 6	95	June 23	8 33
99-04	Best head selection from Imp'd Turkey*	052A	Oct. 6	98	June 27	7 04
100-04	Best head selection from Turkey*	068A	Oct. 6	98	June 27	6 62

*Best heads selected from year to year since 1902, gave seed for above plantings.

Considering the lateness of planting and the unfavorable season, the above yields are good. In this test the hybrids certainly made an excellent showing. A study of the table reveals the fact that in every case, without a single exception, the crossed wheats yielded more than any of the other varieties. No. 46 yielded more than double the amount produced by No. 100-04, which is one of our best Turkey wheats (improved since 1902). These results certainly encourage further investigation along this line in the future.

History will undoubtedly repeat itself, and the farmers will be forced to engage in a more general system of farming. Stock raising and the practice of crop rotation will become a necessity in order to retain the fertility of the soil, which will, to some extent, replace wheat farming alone. Such a change should not be considered any disadvantage, for with it would come the best soil conditions for growing wheat and the crop will continue to be of greatest importance to the western farmer.

It is needless to say that the average yield of wheat is much lower than it should be. Farmers have been accustomed so long to have rich soil at their disposal almost constantly, that they pay comparatively little attention to systematically increasing the yield by proper methods of tillage. Especially is this true in the hard-wheat region of the Northwest. The average yield of wheat for the United States is about 13 bushels per acre, while in Germany and the United Kingdom under high tillage it is 26 and 31 bushels, respectively. With proper attention to the right kind of cultivation of land, the cultivation at proper times, more caution in selecting seed, and better methods of seeding, a fair average increase of two or three bushels would not be unreasonable to expect. This would mean about a 100,000,000 bushel increase for the entire country.

O. H. ELLING.

Press Bulletin No. 147—Dairy and Animal Industry Department.
November 1, 1905.

Kansas Experiment Station Egg-Laying Contest.

The egg-laying contest, arranged by the Kansas White Wyandotte Club and conducted by the Dairy and Animal Industry Department of the Kansas Experiment Station, was completed October 31. Each contesting pen consisted of a male and six females, and the competition lasted one year.

The hens have made a fair record, and the average yield will compare favorably with that of other authentic egg-laying contests. Better records would probably have been made had it not been for some unfavorable conditions which accompany the carrying on of such a contest; as, for instance, the transportation and frequent handling of the fowls, and the adaptation to strange rations and surroundings, all of which tend to diminish the egg yield. Beside these usual unfavorable conditions, the winter was the most severe ever known in the State. The pens in which it was necessary to house the contest fowls were of the curtain front type, and built for the accommodation of twenty-five fowls each. This house, with its ample ventilation, is perfectly satisfactory when filled with a sufficient number of birds per pen to maintain the heat, but with only the six hens prescribed by the rules of the contest the house was cold and the egg yield was reduced proportionally.

The methods of care and feeding followed were designed to bring out fair comparative results of the breeds and of individuals, rather than forced egg yields. A variety of grain was fed the year round. This was fed in straw in the winter and in the yards in the summer. An evening mash was fed the entire year, composed at first of equal parts of bran, chop, meat-meal, shorts, and linseed meal, and later of bran, chop, and meat-meal only. In the winter mangles and alfalfa leaves, and in the summer green alfalfa and rape, were used for bulky food. Oyster shell and grit were supplied. No fresh meat, hot mashes, ground bone, red pepper, patent foods or medicines were fed. The intention was to use only such foods as produced normal results and can be secured at any place or in any season.

CONTESTING PENS.

The following is the list of contesting pens, with notes upon their work:

Single Comb White Leghorns, owned by the Kansas Agricultural College. —This pen, together with the Buff Wyandottes owned by Mr.

Wheeler, are not in the contest as arranged by the Kansas White Wyandotte Club, and should not be considered in the honors of that contest. There being no prizes offered, these results are published with those of the regular contest. Although the College birds were moved from another part of the farm to the laying quarters, it must be admitted that they had some advantage over the birds from a distance, especially in the substitution of other pullets for those lost.

Rose Comb White Leghorns, owned by Mrs. Jennie E. Warren, Cottonwood Falls, Kan. —This pen wins first of the regular contest birds. It is worthy of note that their egg yield held up better in the winter than the Single Comb Leghorns. Both Single and Rose Comb Leghorns suffered a loss of two birds each. The Single Comb birds died suddenly during laying periods, while the Rose Comb pullets died of what is known as "going light."

American Reds, owned by Dr. J. Martin, of Wichita, Kan. —These were the best matured pullets at the beginning of the contest, and show the best winter egg record. They were, in fact, hatched so early that they molted during January. There was no sickness or loss in this pen.

White Wyandottes, owned by Beecher & Beecher, Belleville, Kan. —These pullets maintained good health throughout, except No. B1B. This fowl laid poorly shaped eggs, and during October developed a protrusion of the egg-laying organs, which resulted in death of the hen. No. 4C11 of this group is exceptional for steady laying, and also for the earliest and most rapid molt.

Buff Wyandottes, owned by Mr. G. C. Wheeler, Manhattan, Kan.— This pen showed uniformly good layers except 459, whose unusually poor work brings the pen from a high to a low rank. The best of health prevailed and no loss occurred.

Barred Plymouth Rocks, owned by Mrs. J. W. Jones, Abilene, Kan.— This pen consisted of hens, while all others entered were pullets. This was due to an unfortunate misunderstanding, and is manifestly unfair to the breed, for hens are generally considered to be poorer winter layers than pullets. The hens were inclined to over fatness and were heavy eaters. No. 45 of this pen has a most excellent record for a matured hen. These hens maintained excellent health and suffered no loss.

Light Brahmas, owned by Mr. F. A. Brown, Onaga, Kan.— Brahmas are slow in developing, and these were not developed when placed in the contest and did not lay well except for a short time in the spring. They were in good health, one bird being lost by accident shortly before the close of the contest.

The following tables give the complete results of the contest. The prices taken are on the local Manhattan market, and for sake of comparison, feed prices are given per cwt. All weights given are in pounds or decimal fractions of pounds. The individual loss or gain is figured by assuming that each hen ate one-seventh of the food consumed by the pen. The molting periods are given by the month in which they occurred. The number of broody periods separated by a period of laying is recorded. The laying time lost in breaking up broodiness ranged from ten days upward. The per cent of fertility is recorded only for hens from which ten or more eggs were incubated. The records of the weights of eggs were taken during the summer months, and are incomplete because a few hens were not then laying. The total weights recorded are only approximations, as the weights of a hen's egg are not uniform throughout the season. The feed records include all grain and mash fed and the costs and profits figured are intended to serve for the comparison of the pens, rather than as a basis for figuring the profits of commercial egg-production.

TABLE No. 1—Egg Records of Pens.

BREED	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Total.
Single-Comb White Leghorns	14	49	16	36	131	103	121	125	111	94	57	28	885
Rose-Comb White Leghorns	6	59	81	51	111	93	112	80	71	63	69	32	828
American Reds	59	102	54	24	127	94	96	68	72	52	41	31	820
White Wyandottes	2	36	43	31	139	101	120	91	76	48	77	35	799
Buff Wyandottes	0	44	82	75	110	84	82	73	68	60	47	21	764
Barred Plymouth Rocks	2	29	20	14	129	88	93	72	72	52	37	11	619
Light Brahmas	0	4	19	43	111	88	102	59	50	34	25	4	539

Table No. 2—Value of Eggs and Profit above Feed Cost.

	Single Comb White Leghorns.	Rose Comb White Leghorns.	American Reds.	White Wyandottes.	Buff Wyandottes.	Barred Plymouth Rocks.	Light Brahmas.
November	$0.253	$0.109	$1.068	$0.036	.....	$0.036	.....
December	.804	.968	1.673	.590	$0.722	.476	$0.066
January	.269	1.361	.907	.722	1.378	.336	.319
February	.558	.791	.372	.481	1.163	.217	.667
March	1.454	1.232	1.410	1.543	1.221	1.432	1.232
April	1.112	1.004	1.015	1.091	.907	.950	.950
May	1.367	1.266	1.085	1.356	.927	1.051	1.153
June	.950	.608	.517	.692	.555	.547	.448
July	.932	.596	.605	.638	.722	.605	.420
August	.959	.643	.530	.490	.612	.580	.347
September	.650	.787	.467	.878	.536	.422	.285
October	.342	.378	.378	.427	.247	.134	.049
Total Value	$9.650	$9.743	$10.027	$8.944	$8.990	$6.736	$5.936
Feed Cost	4.764	4.675	5.579	5.676	5.678	6.018	5.814
Gain	4.886	5.068	4.448	3.268	3.312	.718	.122

TABLE No. 3—Prices Used in Computing Data; Feeds per cwt.; Eggs per Dozen.

FEED.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
Corn	$0 60	$0 60	$0 62	$0.63	$0.63	$0.66	$0 66	$0 72	$0.75	$0.82	$0 76	$0 74
Wheat	1 42	1 50	1.58	1.63	1.66	1.75	1 58	1.50	1.42	1.33	1.25	1.22
Oats	.84	.84	.88	88	.94	94	.94	.97	97	.88	84	.84
Barley	1 00	1 00	1.00	1 00	1.00	1 00	1.10	1.10	1.10	1.10	1.00	1 00
Kafir-corn	.62	.62	.66	.66	.71	71	.71	71	.71	.71	.71	.71
Corn-meal	.80	80	85	.85	.90	.95	.95	.97	.97	.97	.92	.90
Bran	85	.85	.90	.90	.95	.90	.85	.80	.75	.70	.65	.65
Shorts	.95	95	1.00	1 00	1 05	1 00	.95	.90	.85	.80	.75	.75
Linseed-meal	1.50	1 50	1 50	1 50	1 50	1 50	1 50	1 50	1 50	1.50	1 50	1.50
Meat meal	2 00	2 00	2 00	2 00	2 00	2 00	2 00	2.00	2 00	2 00	2 00	2 00
Eggs	217	197	202	.186	133	.130	195	.093	.101	.123	137	.147

TABLE No. 4—Individual Laying Records.

HEN.	Nov.	Dec.	Jan.	Feb.	Mar	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Total
51	8	16	2	14	20	17	13	23	20	21	20	8	182
3[1]	6	16	3	6	23	21	22	20	22	18	5	.....	162
21	0	5	3	4	25	20	22	21	23	22	2	0	147
19	0	5	2	10	21	13	21	21	19	14	10	0	136
7[2]	.....	.....	.....	.....	.....	5	24	20	21	14	17	11	112
50	0	4	6	1	21	19	19	20	6	5	0	0	101
60[3]	0	3	0	1	21	8	.....	.....	.....	.....	.....	.....	33
106[4]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	9	12
6	0	12	18	19	2	17	19	19	16	12	11	16	182
99	3	16	18	17	2	20	17	15	14	14	11	0	168
94	0	3	5	6	22	21	23	21	16	18	18	4	157
8	3	14	15	5	24	14	18	11	15	10	14	11	154
68	0	0	11	1	19	13	14	8	10	4	15	1	96
89[5]	.....	.....	.....	.....	.....	8	21	6	0	5	0	0	40
25[6]	0	14	14	3	0	.....	.....	.....	.....	.....	.....	.....	31
3	15	24	19	0	19	16	22	11	18	9	11	20	184
340	14	19	0	2	21	19	19	13	16	10	10	1	144
6	17	24	10	1	19	13	13	7	9	12	5	10	140
214	10	12	0	1	24	17	22	20	15	14	4	0	139
233	3	23	19	17	22	13	8	5	0	0	0	0	110
218	0	0	6	3	22	16	12	12	14	7	11	0	103
4C11	2	22	24	19	24	21	23	24	5	5	21	0	190
4C9	0	0	19	10	22	13	12	16	10	12	15	10	139
4A7	0	0	0	0	24	17	23	14	15	12	22	22	149
4C12	0	0	0	0	23	18	26	9	22	9	12	0	119
B1B[7]	0	0	0	0	23	16	20	15	15	6	7	3	105
4A4	0	14	0	2	23	16	16	13	9	4	0	0	97
6	0	20	21	14	21	15	13	18	18	15	19	6	180
14	0	9	18	2	22	19	18	16	20	12	21	5	162
20	0	3	16	16	27	14	21	18	17	16	2	1	151
12	0	12	17	16	22	18	19	8	16	5	0	0	133
42	0	0	10	19	18	18	9	13	15	12	5	9	128
159	0	0	0	8	0	0	2	0	0	0	0	0	10
45	0	14	20	10	24	18	20	21	14	15	18	11	185
7	2	15	0	2	22	11	21	13	11	18	16	0	131
67	0	0	0	0	23	13	17	13	14	3	0	0	83
98	0	0	0	0	18	16	13	10	13	9	1	0	80
10	0	0	0	2	22	17	8	12	11	5	0	0	77
70	0	0	0	0	20	13	14	3	9	2	2	0	63
25	0	0	2	18	18	15	11	14	17	10	1	0	106
8[8]	0	4	7	10	23	17	19	12	3	0	8	0	103
70	0	0	0	0	21	17	19	9	12	7	10	0	95
54	0	0	0	0	13	17	19	15	11	7	4	4	90
18	0	0	0	2	20	12	17	7	7	10	0	0	75
21	0	0	10	13	16	10	17	2	0	0	2	0	70

[1] [2] Died Sept. 12.
[3] Entered April 17. Died April 16.
[4] [5] Entered September 25.
[6] Entered Apr. 5, Died Oct. 24. Died March 31.
[7] [8] Died October 18. Died October 21.

TABLE NO. 5—Other Individual Data.

HEN.	Value of Eggs	Loss	Gain	Moulting Periods	Times Brood'd	Per Cent of Fertility	Pounds of Eggs per doz.	Estimated Total Wt., pounds
51	$2.079		$1.286	Oct.	0	100	1.38	20.9
3	1.823		1.128		0	95	1.35	18.2
21	1.538		.743	Oct.	0	93	1.35	16.5
19	1.457		.663	Oct.	0	84	1.31	14.8
7	1.177		.756	Oct.	0	59	1.61	15.0
50	1.088		.298	Sept.	0	89	1.41	11.9
60	.384		.011		0	96		
106	.144		072	Oct.	0			
6	2.169		1.390	Oct.	0	100	1.40	21.2
98	2.047		1.268	Oct.	0	100	1.39	19.6
94	1.678		.899	Oct.	0		1.40	18.3
8	1.820		1.050	Oct.	1		1.23	15.8
8	1.079		.300	Oct.	3		1.41	11.3
89	.420	.013			0			
25	.511		175		0			
3	2.333		1.403	Jan.	2	90	1.48	22.7
340	1.710		.770	Jan.	5	96	1.56	18.7
6	1.814		.884	Jan.	4	92	1.40	16.3
214	1.558		.628	Jan.	1	90	1.37	15.0
233	1.531		.601	Oct.	3	65		
218	1.105		.175	Oct.	5	79	1.55	13.3
4C11	2.363		1.412	July	1	97	1.68	26.6
4C9	1.605		.654	Sept.	4	92	1.57	19.5
4A7	1.574		.623	Aug	3	83	1.42	18.8
4C12	1.225		274	Aug	4	95	1.55	13.5
B1B	1.062		.146		0	93	1.49	12.7
4A4	1.085		.134	Aug	3	97	1.43	11.6
6	2.161		1.215	Oct.	4		1.47	23.0
14	1 836		.890	Oct.	2		1.40	16.2
20	1.722		.876	Oct.	0	50	1.60	20.0
12	1.630		.684	Sept.	2	53	1.33	14.7
42	1 470		.529	Sept.	5		1.42	15.1
459	.147	799		Oct.	1			
45	2.167		1.164	Aug	0	57	1.45	22.2
7	1.471		.468	Sept.	2	91	1.38	15.1
67	.835	.168		Aug.	1	100	1.40	10.8
98	.808	.195		Sept.	2	92	1.52	10.1
10	.784	.219		Sept.	1	100	1.51	9.6
70	.662	.341		Aug	2	90	1.40	8.1
25	1.151		.177	Oct.	7		1.45	12.8
8	1.199		.230	Aug.	0		1.57	13.5
70	.986		.012	July	2		1.60	12.5
54	.909	.065		July	3		1.45	10.4
18	.789	.185		July	5		1.71	10.7
21	.887	.087		Sept.	1		1.53	8.9

TABLE NO. 6.—Amount in Pounds and Cost of Feed by Months.
SINGLE-COMB WHITE LEGHORNS.

FEED.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
Corn	5.0	6 0	4.2	3.4	6 0	8.0	7 3	6 4	7.7	8.2	8.1	10.5
Wheat	5.5	6.0	6.0	6.8	7 5	7.0	6.1	6.4	7 0	5.8	5.4	6.9
Oats							3 4	2.7	3.0	3.8	4.2	
Barley	2.0	3.0	6.8	6.2	1.0	2.0	2 5	2 8	3.1	3.6		2.4
Kafir-corn	5.5	6.0	7.1	6.3	4.5	3.1						
Corn-meal	5.0	5.1	4 8	3 6	3.7	5 8	6 2	7.0	6.5	7.3	4.9	4.4
Bran	5.0	5.1	4 8	3 6	3.7	5.8	6 2	7.0	6.5	7.3	4.9	4.4
Shorts	5.0	5.1	4.8	3 6	3.7						4.9	4.4
Linseed-meal	5 0	5 1	4.8	3.6	3.7						4.9	4.4
Meat meal	5.0	5 1	4 8	3 6	3 7	5 8	6 2	7.0	6.5	7.3	4.9	4.4
Cost, in cents	.466	.503	535	447	.439	439	439	460	470	485	447	428

TABLE No. 6 (Continued).

ROSE-COMB WHITE LEGHORNS.

FEED.	Nov.	Dec.	Jan.	Feb.	Mar	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
Corn	5.0	6 0	4.2	3 4	6.0	8.0	7.1	6.6	7.2	7.5	8.4	8.1
Wheat	5.5	6 0	6.0	6.8	7.5	7.0	5.8	6.6	6.4	5.4	5.7	4.2
Oats	.....	.....	.....	.....	.....	.....	3.4	2.7	3.0	3.8	4.2	.....
Barley	2.0	3 0	6 8	6.2	1.0	2.0	2.5	2.8	3.1	3.6	.....	2.4
Kafir-corn	5 5	6.0	7.1	6 3	4.5	3.1	.....	.....	.....	.....	.....	.....
Corn-meal	4.8	5 1	5 2	3 8	3 7	5.4	6.2	7.0	6.5	7 3	4 9	4.1
Bran	4 8	5 1	5 2	3.8	3.7	5.4	6 2	7.0	6.5	7.3	4.9	4 1
Shorts	4 8	5 1	5.2	3.8	3.7	.....	.....	.....	.....	.....	4 9	4.1
Linseed-meal	4 8	5.1	5.2	3 8	3.7	.....	.....	.....	.....	.....	4 9	4 1
Meat meal	4 8	5 1	5 2	3 8	3.7	5.4	6 2	7.0	6.5	7.3	4.9	4.1
Cost, in cents	452	503	559	398	.439	.429	434	481	458	.477	.453	373

AMERICAN REDS.

Corn	6 1	6 0	4 2	3 4	6 0	8 0	8 4	8.7	10.1	10.2	11 7	10.5
Wheat	6.8	6 0	6 0	6.8	7 5	7.0	7.9	8.3	7 0	6.4	6.6	7 5
Oats	.....	.....	.....	.....	.....	.....	3.4	2.7	3.0	3.8	4 2	.....
Barley	6 0	3 0	6 8	6.2	1.0	2 0	2 5	2.8	3.1	3.6	.....	2.4
Kafir-corn	7 2	6.0	7 1	6.3	4 5	3.1	.....	.....	.....	.....	.....	.....
Corn-meal	5 1	5 8	6 2	4.8	4 4	6.7	7.9	6.8	7.6	8.4	6 0	5 1
Bran	5.1	5 8	6 2	4.8	4 4	6.7	7.9	6.8	7.6	8.4	6.0	5.1
Shorts	5 1	5 8	6 2	4 8	4.4	.....	.....	.....	.....	.....	6.0	5.1
Linseed-meal	5 1	5 8	6 2	4 8	4 4	.....	.....	.....	.....	.....	6.0	5.1
Meat meal	5 1	5 8	6.2	4 8	4.4	6 7	7 9	6 8	7.6	8 4	6.0	5.1
Cost, in cents	536	619	638	523	523	474	.538	514	.521	.556	.560	510

WHITE WYANDOTTES.

Corn	6 1	6 0	4 2	3.4	6 0	8.0	8 4	9.1	12.9	10.8	13 6	10 8
Wheat	6 8	6 0	6 0	6 8	7 5	7.0	7.9	8.8	8.2	7 9	6 6	6 9
Oats	.....	.....	.....	.....	.....	.....	3 4	2.7	3.0	3.8	4.2	.....
Barley	6 0	3 0	6 8	6 2	1.0	2.0	2.5	2.8	3.1	3.6	.....	2 4
Kafir-corn	7.2	6.0	7.1	6.3	4 5	3 1	.....	.....	.....	.....	.....	.....
Corn-meal	5 6	6 0	6.2	5.2	4 9	7.7	7.8	8.5	8.3	9.1	5.8	5 2
Bran	5 6	6 0	6.2	5 2	4.9	7.7	7 8	8.5	8 3	9.1	5.8	5.2
Shorts	5 6	6.0	6.2	5.2	4 9	.....	.....	.....	.....	.....	5.8	5 2
Linseed-meal	5.6	6 0	6.2	5 2	4.9	.....	.....	.....	.....	.....	5 8	5.2
Meat meal	5 6	6 0	6 2	5 2	4.9	7.7	7.8	8 5	8.3	9 1	5.8	5.2
Cost, in cents	570	529	.623	547	500	513	.534	573	581	.601	.562	.489

BUFF WYANDOTTES.

Corn	6 1	6 0	4 2	3.4	6 0	8 0	8 4	9 0	11.6	10.8	10 8	10.2
Wheat	6 8	6 0	6 0	6.8	7 5	7 0	7.5	8 3	7.9	8 0	6.0	6 6
Oats	.....	.....	.....	.....	.....	.....	3.4	2.7	3.0	3.8	4.2	.....
Barley	6.0	3 0	6 8	6.2	1.0	2.0	2.5	2 8	3.1	3.6	.....	2.4
Kafir-corn	7 2	6 0	7.1	6.3	4.5	3.1	.....	.....	.....	.....	.....	.....
Corn-meal	6.6	6 2	7.0	5.4	4.8	7.4	7.2	8 1	7.6	8.7	5 7	5 1
Bran	6.6	6.2	7 0	5.4	4.8	7.4	7 2	8.1	7.6	8.7	5 7	5 1
Shorts	6 6	6 2	7.0	5.4	4.8	.....	.....	.....	.....	.....	5.7	5.1
Linseed-meal	6 6	6 2	7.0	5.4	4 8	.....	.....	.....	.....	.....	5.7	5.1
Meat meal	6 6	6.2	7 0	5 4	4.8	7 4	7.2	8 1	7.6	8 7	5 7	5 1
Cost, in cents	631	.572	.571	.561	.495	.498	504	550	540	587	536	479

BARRED PLYMOUTH ROCKS.

Corn	6 1	6 0	4.2	3.4	6.0	8 0	5.4	9 0	12.5	13.2	14.1	10.8
Wheat	6 8	6.0	6.0	6 8	7.5	7 0	7 2	8 6	9.0	7.9	6.3	6 9
Oats	.....	.....	.....	.....	.....	.....	3.4	2 7	3.0	3 8	4 2	.....
Barley	6 0	3 0	6.8	6.2	1.0	2 0	2.5	2.8	3.1	3.6	.....	2.4
Kafir-corn	7 2	6 0	7 1	6 3	4.5	3 1	.....	.....	.....	.....	.....	.....
Corn-meal	7.2	6 4	7 2	5.4	5.0	8 0	10.0	9.4	8 3	9.5	5.9	5.2
Bran	7 2	6 4	7.2	5.4	5.0	8 0	10.0	9 4	8.3	9 5	5.9	5.2
Shorts	7 2	6 4	7.2	5 4	5.0	.....	.....	.....	.....	.....	5 9	5 2
Linseed-meal	7 2	6 4	7 2	5 4	5.0	.....	.....	.....	.....	.....	5.9	5.2
Meat meal	7 2	6.4	7.2	5 4	5.0	8 0	10 0	9.4	8.3	9.5	5.9	5 2
Cost, in cents	.669	.587	684	.559	.508	525	608	603	590	638	.567	.489

TABLE NO. 6 (Concluded).

LIGHT BRAHMAS.

FEED.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
Corn	6.1	6.0	4.2	3.4	6.0	8.0	8.4	9.0	12.5	13.0	12.9	10.8
Wheat	6.8	6.0	6.0	6.8	7.5	7.0	7.2	8.6	9.0	6.8	6.3	6.9
Oats	.....	.....	.....	.....	.....	.....	3.4	2.7	3.0	3.8	4.2	.....
Barley	6.0	3.0	6.8	6.2	1.0	2.0	2.5	2.8	3.1	3.6	.....	2.4
Kafir-corn	7.2	6 0	7.1	6.3	4.5	3.1	.....	.....	.....	.....	.....	.....
Corn-meal	6.4	6.4	7.6	5.6	5.0	7.9	8.4	8.6	8.1	8.5	5.7	5.1
Bran	6.4	6.4	7.6	5.6	5.0	7.9	8.4	8.6	8.1	8.5	5.7	5.1
Shorts	6.4	6.4	7.6	5.6	5.0	.....	.....	.....	.....	.....	5.7	5.1
Linseed-meal	6.4	6.4	7.6	5.6	5.0	.....	.....	.....	.....	.....	5.7	5.1
Meat meal	6.4	6.4	7.6	5.6	5.0	7.9	8 4	8 6	8.1	8.5	5.7	5.1
Cost, in cents	.618	.551	.698	.567	.506	.521	.548	.569	.585	.588	.548	484

O. ERF,
MILO M. HASTINGS.

Press Bulletin No. 148.—Veterinary Department.
December 19, 1905.

A Troublesome Parasite of the Horse.

(The Palisade Worm—Strongylus Armatus.)

During this autumn (1905) complaints have been quite numerous from different parts of the State regarding a peculiar fatal trouble among horses. In some localities the disease has been called "malarial fever" on account of the symptoms of the animal resembling somewhat malarial fever in man. In other sections it is called "blind staggers" and "poisoning," and in still others the staggering gait of the hind quarters of the animal might seem to warrant the name given to it, "partial paralysis." The trouble is caused by the armed strongle or palisade worm, *Strongylus armatus* or *sclerestoma equinum*, a dull gray or reddish brown worm which, in its immature stage, is found in nearly all parts of the body of the animal. This worm, when full grown, is from three-quarters inch to two inches in length and is then found almost entirely in the beginning of the large intestine. It is expelled sometimes in great numbers with the excreta.

Description of the Parasite.— Thick at its head end, it tapers backwards ending in a blunt point; its mouth is round, open, and furnished with several hard rings, of which the outer one bears six short, blunt, teeth-like projections, and the innermost a row of closely set, pointed teeth. The female has a blunt, pointed tail, but the male has two lateral projections joined by a rudimentary central lobe. This minute description is given in order to distinguish it from the *strongylus tetracanthus*, a somewhat lighter colored and smaller worm, which it resembles in many respects and which is found in the intestines only, either free or attached to the intestinal wall.

Life History.—The worms are found in the horse in two periods of existence. The mature worms are usually found attached to the mucous membrane of the intestinal wall of the large intestine—caecum and colon—with the head sunk deep for the purpose of sucking blood, which gives them the brown or red color. The immature are found sometimes in the same organs in a small capsule or covering, in small pellets of manure, in cavities or cysts varying in size from a pin-head to that of a hazelnut in the walls of the intestines, and also in the arteries and other structures of the body.

The egg being laid in the intestinal canal of the horse sometimes hatches there, but more often does not hatch until a few days after it reaches the external world. If conditions are suitable in the way of moisture and temperature, the worm may live for several months in this stage in damp places, such as fodder, pasture or stagnant water. It is in this stage that the worms are taken into the system of the horse. Reaching the intestine of the animal they bore their way into the mucous membrane and encyst themselves. Should they find a blood vessel in their migrating they are carried into the circulation. It is the most common parasite found in the circulatory system of the horse, and it is in this way that it is carried to almost any organ of the body.

Symptoms. —When present in the kidney or in the arteries leading to the kidneys, or in the surrounding tissues, a horse is especially sensitive to pressure over the loins, and they have been known to cause paralysis.

When found in the brain, an animal during work suddenly begins to stagger, the eyes are fixed, and the horse shows many of the symptoms of "blind staggers."

When the large arteries of the abdomen are affected, and this is their favorite location in the circulatory system, the animal is frequently subject to colics, which often result in death. This is also the case when found in great numbers in the intestine. It has been estimated that in some localities as high as 90 per cent of colics are caused by this parasite.

Treatment. —Is both preventive and curative. Preventive, by thoroughly inspecting the food and water supply, to see that there are no parasites present in the drinking water. Keep the horses from all stagnant ponds. All surface wells should be inspected. Hay and fodder from swampy lands are to be looked upon as suspicious. Even pastures which are subject to overflows and seepage should be avoided; cattle seem to be exempt. Medicinal treatment in the way of prevention, as well as curative, consists of

a prolonged, careful use of some of the essential oils. The most of these, if they can be had at all in the smaller towns, are too expensive for general use. It is therefore necessary to take the best obtainable in the form of a common remedy, and that has proved to be the oil or spirits of turpentine. An ordinary animal will stand two ounces of turpentine given in a pint to a quart of raw linseed oil, thoroughly mixed. If the animal is badly affected, the above dose may be given night and morning for two or three days, then omit for a week or two and repeat. The remedy should be discontinued as soon as the animal shows signs of irritation of the kidneys. Some horses are more sensitive in this respect than others. Two or four doses may be given every two to three months to expel the worms from the intestinal tract.

Caution. —This trouble should not be confounded with the "blind staggers," cerebritis, frequently present in the fall of the year, which is caused by the animals eating moldy corn or fodder. For this latter trouble there is, as yet, no satisfactory cure. If the animal has had access to affected corn or stalks the cause of the trouble may probably be decided upon without further investigation.

F. S. SCHOENLEBER.

Press Bulletin No. 149–Animal Husbandry Department.
March 27, 1906.

Swine Feeding Tests.—Armour's Deodorized Meat Meal and Alfalfa Hay as Supplementary Feeds to Corn.

Numerous questions are being received at the Kansas Experiment Station as to the value of the various packing-house by-products recommended for swine feeding in connection with corn, and during the winter of 1905-'06 an experiment was carried on to secure more data on the subject. The value of alfalfa hay as a means of increasing the value of corn in pork production was also made the subject of one test in this experiment. Its value for growing swine and breeding stock has been recognized for some time, but its value in the fattening pen is still a subject of inquiry. Thirty strong, thrifty shoats were available for this experiment, and they were divided as equally as possible into three lots of ten pigs each. The pigs were all crossbred, and in the division an equal number of each particular cross were placed in each of the three lots as follows: Three Berkshire x Yorkshire pigs, three Berkshire x Tamworth pigs, two Poland-China x Berkshire pigs, and two Poland-China x Duroc-Jersey pigs. The average weights of these three lots on October 9, 1905, when the experiment began, were as follows:

Lot I, 129 pounds; Lot II, 127.5 pounds; and Lot III, 131 pounds.

The rations were as follows:

Lot I, corn-meal.
Lot II, corn-meal 5/6 and Armour's deodorized meat meal 1/6.
Lot III, corn-meal and all the alfalfa hay they would consume.

A feed rack was used for the alfalfa hay similar to a sheep rack without legs. This method kept alfalfa hay before them at all times without waste. The hay was fed uncut.

TABLE I.—Weights and Gains.

No. of Lot.	No. of pigs.	Days fed.	Weight Oct 9, '05.	Weight Jan. 29, '06	Total gain lbs.	Av. daily gain per head, lbs.
I	10	112	1,290	2,400	1,110	.99
II	10	112	1,275	3,250	1,975	1.76
III	10	112	1,310	2,630	1,320	1 18

TABLE II.—Financial Statement.

No. of Lot.	Wt at beginning.	Value at beginning, $4.00 per cwt.	Wt. on Topeka market, lbs.	Selling price per cwt.	Proceeds on market, per lot.	Av. expense of marketing, per lot.	Total cost per lot.	Net profit per hog.
I	1,290	$51 60	2,320	$5 32½	$123 54	$3 50	$103 16	$2 04
II	1,275	51 00	3,143	5 40	169 72	3 50	134 59	3 51
III	1,310	52 40	2,525	5 35	135 08	3 50	110 48	2 46

TABLE III.—Feed-cost and Cost of Gains.

No. of Lot.	Kind of feed.	Pounds fed.	Value of feed consumed.		Cost of gain per cwt.	Pounds of feed per 100 lbs. of gain.
			Per cwt.	Total.		
I	Corn-meal	7,690	$0 62½	$48 06	$4 33	692.8
II	Corn-meal	7,848	62½	$49 05	4 05	397 3
	Meat meal	1,552	2 00	31 04		78 5
Total				$80 09		
III	Corn-meal	7,875	62½	$49 22	4 13	596 5
	Alfalfa hay	1,340	40	5 36		101 5
Total				$54 58		

The value received per bushel for corn marketed via the pork route is an excellent method of calculating the profit from feeding. In the case of Lot 1, figuring the cost of the pigs at the beginning of the experiment at 4 cents per pound, we have the difference between $51.60 and $123.54, or $71.94, to credit to the 13.73 bushels of corn which each pig consumed, returning a value of 52 cents per bushel for the corn. With Lot II, after deducting from the $169.72 received for the hogs at the market, the cost at 4 cents, or $51, and the cost of the meat meal fed, we have $87.68 to credit to the 14 bushels of corn which each pig consumed, or a value of 62 1/2

cents per bushel. With Lot III we have left $77.32 to credit to the 14.06 bushels of corn consumed per pig, after deducting $52.40, the original cost of the ten pigs, and $5.36, the cost of the hay consumed. This gives a value of 55 cents per bushel for the corn fed. This shows that 20 per cent is added to the value of corn by feeding meat meal at $2 per cwt. as a supplementary feed, and 5.8 per cent added to the value of the corn by alfalfa hay at $8 per ton.

These hogs were shipped direct to the Chas. Wolff packing-house, Topeka, Kan., and slaughter tests were obtained of the different lots. The government inspector, Dr. DeWolf, pronounced the whole bunch as unusually healthy. The lymphatic glands were large and soft, and only one case of parasitic infection of the liver was found. All had more leaf-lard than the average hog sold on the market. The amounts for the different lots were as follows: Lot I, 90 pounds; Lot II, 94 pounds; Lot III, 90 pounds. Although Lot II seemed much fatter and heavier on foot, the leaf-lard was but slightly greater. The superintendent of the packing-house, Mr. J. B. Nicholson, stated that the flesh of Lot II seemed firmer than the others in the warm condition. The hogs receiving alfalfa hay showed very fine carcasses.

The results of this experiment serve to emphasize the importance of converting the raw material of the farm into a more finished product in order to secure higher prices on the market, and also to retain a much higher per cent of the fertilizing value of the grain. For this purpose no farm animal is better fitted than the well-bred, thrifty hog when fed and cared for in a rational manner.

R. J. KINZER.
G. C. WHEELER.

Press Bulletin No. 150.—Entomological Department.
April 24, 1906.

The San Jose Scale in Kansas.

While no systematic survey of Kansas has been made to ascertain the absence of the San Jose scale in the State, the evidence available to date has given the impression that the pest has not occurred to any recognizable or at least serious extent within our boundaries. The testimony of orchardists and nurserymen in convention in the various horticultural meetings, the reports of those engaged in the inspection of nurseries so far as this work has gone, and the correspondence of the entomologists in the State schools has not disclosed the presence of the true pest, and many supposed cases have been ascertained by competent students to have been other forms of injury.

A month ago, however, there was received at the Kansas Experiment Station, from Mr. B. S. Williams, of Dodge City, an apple twig crowded with the true San Jose scale, and as the indication was that of a seriously infested tree, a visit to the locality was made to determine the extent of the attack. An examination of the locality showed several apple-trees of ten years of age thickly incrusted with the insect, and in most of the residence lots in the surrounding quarter of the town the condition was the same, the fruit-trees of all sorts showing the insect in greater or minor abundance. Here and there was noted a tree of the apple, pear or peach so thoroughly attacked that it was dead or dying, while others showed the presence of the scale in smaller quantities, permitting the relief of the trees if prompt measures were taken for the destruction of the pest.

Besides the sorts of fruit-trees above named, inspection showed the following to be more or less infected: Plum of all sorts, native and cultivated cherries of several horticultural groups, apricot, plumcot, grape, currant, rose bushes of several types, and among ornamental or shade trees, osage orange, cottonwood (one case), and Russian mulberry. So far as ascertained the scale did not occur on box-elder, black locust, honey-locust, elm, althea, the honeysuckles, virginia creeper or spiraea, though plants of these sorts among others, were growing among or near infested fruit-trees. On the whole, however, the infestation was as serious as might be feared anywhere, including within the limit of the area about a dozen blocks in Ward 2 of the city, with scattered cases outside of this general section. An attempt to locate the site of the original infection was without result, owing to the general and even distribution of the pest within the area indicated. It was also found that suspicion could not be placed with likelihood of proof upon any nursery, as the trees were largely purchased from agents, and the places where they were grown were not known originally, or were not on record.

For the information of those who have not seen this insect, it may be described as a small sap-sucking louse, active when first born, but soon becoming immovable on the bark, leaf, or fruit, and secreting at this stage a flattened protective scale over its body, losing at the same time its more obvious insect structure, and devoting its energies thereafter to feeding on the sap of the plant, and producing young in great numbers. In cases where the scale lice are in moderate numbers, they will occur in small colonies or groups, or scattered singly over the bark, presenting then no striking mark to the vision unless one is looking for them. When

scattered in this manner on younger bark the tissue is generally reddened around them, a feature which lends to their more ready recognition. The adult females are the largest scales, slightly irregular in their convexity, of a dull gray or lighter, with a distinct boss or center of a different color and appearance. Young scales, also abundant at the present season, are smaller, more distinctly circular, and of a darker color, often nearly black. All sizes occur together in the clusters, frequently so crowded that the true color of the bark is not visible for the scurfy covering consisting of the numerous insects.

In May the female gives birth to young, and these travel over the tree in search of unoccupied spaces, which they occupy and then begin the secretion of the protecting scales as above. With several indeterminate broods each season, the new growth is covered as fast as made, and the tree is not able to outgrow its enemy. The injury is done by the abstraction of the sap from all parts of the tree by the hundred thousand beaks throughout the entire growing season.

Owing to the form and feeding habits of the scale lice, the effective agents in their destruction are practically limited to the various washes and sprays that act as contact poisons or corrosives. Among these are crude petroleum, coal-oil, resin washes, and combinations of lime, sulphur, and salt, among others. Several of these are open to the objection that while destructive to the insects they also endanger the tree. Others can not be relied upon to kill the insects in all stages, necessitating the frequent repetition of treatment. At the present date the leaf and flower buds being expanded, perhaps as satisfactory a treatment as any is the application of a spray of moderately strong kerosene emulsion, previously preparing the trees by pruning off all that can be spared of the branches, to reduce the surface to be operated on. The application of this spray should be several times repeated during the spring and summer. This will not be completely effective, but may serve as a temporary check. It should not need saying that every infested twig and all other parts should be carefully picked up and burned, to prevent the further spread of the pest.

A more satisfactory treatment is the application, in the dormant season of the tree, of a wash or spray of the lime, sulphur and salt mixture, as employed with good effect in eastern orchards. With this material treatment must be deferred until the tree is again dormant, as the buds are now expanded.

The presence of this serious pest in Kansas orchards, even in the single case noted, is a warning that our State should be no

longer without the protection of an effective inspection and quarantine law controlling the sale and shipment of trees and other nursery stock liable to transport this dangerous insect, and providing for the inspection of orchards, generally, over the State.

E. A. POPENOE.

Press Bulletin No. 151.—Fort Hays Branch Experiment Station.
May 29, 1906.

Baby Beef Production with Western Feeds.

In order that the western farmer may realize the most profit from his land for a series of years and still maintain the fertility of the soil, he should not neglect the stock industry. Whether it be hogs or cattle; whether he feed for beef or milk matters little, for in any case a part of each crop taken from the field will be fed on the farm, and returned to the land in the form of barn-yard manure, instead of being shipped direct to other markets. This western soil is fertile, yet not inexhaustible.

Realizing the importance of retaining the fertility of the soil and desiring to be more able to answer requests for information as to the feeding value of various grains, the Fort Hays Branch Experiment Station fed sixty head of calves with feeds that can be grown with a marked degree of certainty in the West. The calves were grade Hereford and Shorthorn, steers and heifers. They had been weaned, and vaccinated for blackleg just previous to putting in the feed lots. The 60 head, averaging 400 pounds each, were uniformly divided into four lots consisting of ten heifers and five steers to the lot, and each bunch fed a different ration. The steers were raised at the Station and the heifers were purchased in the vicinity of Hays.

After taking the average of three successive weighings, the calves were carefully apportioned into lots and each lot of calves was fed roughage for two weeks, after which they were again weighed. These weights of the various lots being sufficiently close, no changes were made and the first grain was fed December 7, 1905, 157 days previous to the close of the experiment.

The four lots of calves were numbered and rations given them as follows:

Lot IV. Fed corn-and-cob-meal and alfalfa hay.
Lot V. Fed ground barley and alfalfa hay.
Lot VI. Fed ground emmer and alfalfa hay.
Lot VII. Fed ground Kafir-corn and alfalfa hay.

In all the feeding, the alfalfa was placed whole in the bottom of the feed troughs and the ground grain poured over it. The cattle were fed twice daily, morning and evening, the grain and hay.

being weighed out to each lot at every feed. They were started on feed with all the roughage they would clean up, which was an average of 9 pounds per head daily, and with a grain ration of 2½ pounds per head daily. The quantity of grain was gradually increased and the roughage cut down when necessary. The calves took readily to the feed and at no time during the experiment did any of the lots seem to tire of their ration.

The accompanying table gives the total amount of feed eaten, the pounds of grain and hay required to make 100 pounds of gain, the average beginning and closing weights, and daily average gain per head for the entire period, including the preliminary feeding, or 168 days. There were 15 calves in each lot.

TABLE I.

Lot No.	Ration.	Feed.		For 100 pounds Gain.		Av. per head beginning lbs.	Weights & Gains.	
		Grain lbs.	Hay lbs.	Grain lbs.	Hay lbs.		Av. per head close, lbs.	Gained av. per day, lbs.
IV.	Corn-and-cob-meal and alfalfa.....	22,118	17,524	484	383½	400	704	1.81
V.	Barley and alfalfa.....	17,512	18,349	416	435	395	675	1.66
VI.	Emmer and alfalfa.....	17,174	19,465	430	487	401	667	1.58
VII.	Kafir-corn and alfalfa...	18,574	20,510	457	505	404	675	1.61

It will be observed from the table that lot VII ate more pounds of both grain and hay than any of the other lots, excepting the grain eaten by lot IV, which received corn-and-cob-meal that weighed 70 pounds per bushel instead of 56 pounds per bushel, as Kafir-corn. In the column headed "Grain and Hay for 100 pounds Gain," emmer compares favorably with barley, although a trifle more alfalfa was required to produce 100 pounds gain with emmer than the same gain with the barley ration. It required 54 pounds more of the corn-and-cob-meal, to produce 100 pounds of gain, than of the ground emmer, but with the latter, 103½ pounds more of the roughage was fed than was fed with the corn-and-cob-meal ration. With the Kafir-corn ration more pounds of both grain and hay were required to produce 100 pounds gain than with either the barley or the emmer rations. It should be stated, however, that both emmer and barley are quite laxative feeds, and when fed with alfalfa hay the tendency is to produce looseness when a heavy ration is fed. Because of the experimental feature of the feeding, nothing to counteract this laxativeness of the rations, such as prairie hay or Kafir-corn would have been, was added to either the barley or emmer rations. And it is not unlikely that, had prairie hay been added to both of these rations during the last 70 days of

the experiment, the results would have been still more favorable. The emmer-fed calves, up to within seventy days of the close of the test, showed better gains than either of the other lots.

TABLE II.—The Financial Result.

Lot No.	Calves cost.	Feed cost.	Cost of 100 lbs. gain.	Sold for.	Net proceeds.	Profit or loss per head.	Margin between buying and selling price of calves
IV	$224 92	$177 14	$3 89	$4 75	$449 11	$3 13 gain	$1 00
V	222 04	179 95	4 29	4 60	417 25	1 02 gain	0 85
VI	225 56	185 12	4 65	4 35	383 07	1 84 loss	0 60
VII	227 28	202 83	5 01	4 50	410 59	1 30 loss	0 75

NOTE: In computing cost of feed, local prices for the various feeds were used, i.e., ear corn 39c per bushel, corn-meal 42c per bushel, corn-and-cob-meal 42½c per bushel, barley 36c per bushel, emmer 36c per bushel, Kafir-corn 46c per bushel, and alfalfa at $5 per ton.

The calves were valued at $3.75 per hundred weight at the beginning of the experiment, which gives a margin of $1.00 for those of lot IV, 85 cents for lot V, 60 cents for lot VI, and 75 cents for lot VII, between the selling price of the respective lots at the Kansas City Stock Yards, where each lot was sold on its merits, when the experiment closed, and the purchasing price. The cost of 100 pounds of gain ranges from $3.89 with the corn-and-cob-meal ration, the least expensive, to $5.01 with Kafir-corn as ration, and most costly; the cost of 100 pounds gain with the barley and emmer rations being $4.29 and $4.65 respectively.

In the slaughter test, lot IV dressed 56.5 per cent, lot V, 56.4 per cent, lot VI, 54.7 per cent, and lot VII, 57.3 per cent.

The price per pound for which the calves of the several lots sold indicates very nearly the condition, or ripeness, of the cattle at the time of shipment. The percentage of dressed weight, with the possible exception of lot VII, which dressed out nearly one per cent higher than any of the other lots, compares favorably with the selling prices. The emmer-fed calves did not stand shipping as well as the rest and the shrinkage was nearly two per cent more than with the Kafir-corn-fed cattle. The shrinkage on the entire sixty head was 4.67 per cent. O. H. ELLING.

Index.

The Station Publications.

The publications of the Experiment Station include Press Bulletins, Bulletins, and Annual Reports.

The Press Bulletins are issued in limited numbers and sent to the papers, to certain state and county officers, and to a considerable number of public or semi-public institutions. Our hope is that through them farmers may learn something of the Station work, and be led to apply for the regular bulletins, and also that the local papers, by reprinting them, may give wider currency to the information they contain. It is suggested that any who appreciate the value of them can serve the community at large as well as themselves by using a little effort in inducing the papers to reprint them. They are short, readable, and popular, but, at the same time, accurate articles on subjects of current interest, and embodying observations and experiments of members of the Station staff.

The Bulletins are the means of communicating the results of the Station work directly to the farmers. They are issued in the quantities judged necessary to meet the demand. At present 29,000 copies are printed. All investigations are described in them when completed, and they are sent to all on our mailing lists, including all the newspapers of Kansas, as required by law. Farmers are invited to send the names of others who would value the Bulletins, and samples will be sent them, with return cards upon which applications for future issues may be made.

The Annual Reports since 1889 have consisted chiefly of the financial statements with brief accounts of the general progress of the Station and its departments. In the seventeenth, and especially the eighteenth, there is, however, more matter of general interest. In each Report there is an index to the Bulletins for the corresponding period. To those who preserve the Bulletins this is a valuable feature, and copies of these reports will be sent to all who apply for them as long as a supply remains.

All requests for publications should be addressed:

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