

Reports of the Kansas State Board of Agriculture

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These reports by the State Board of Agriculture include the proceedings of the board, reports for the previous year, maps of counties, abstracts of counties, miscellaneous articles, and reports of agricultural societies, the state fair, state and county statistics, agricultural industries and products, the agricultural college, and the Kansas Academy of Science. The annual reports began in 1872 and were succeeded by biennial reports beginning in 1877-78. Volume numbers were discontinued with the 1953-1956 report; the last being volume 44. From 1953 to 1976 the reports drop "biennial" from the title. Annual reports begin again from 1976 to 1984, except 1982-1983 which is biennial. The dates for each report reflects the reporting year and not the publication date, which was usually a year later. The title of each report reflects the form given on the title page. Only volumes 1 (1872), 2 (1873), 3 (1874), 4 (1875), the centennial edition (1875), 5 (1876), 6 (1877-1878), 7 (1879-1880), 10 (1885-1886), 11 (1887-1888), 13 (1891-1892), and 14 (1893-1894) are currently available.

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acre. I have had six years' experience with 300 acres, on "bottom" and "second bottom," with subsoil of sand and gravel, and sandy soil, respectively. Well water is reached at 3 to 10 feet; the "first bottom" is always moist six inches under the surface, and the "second bottom" naturally dry from surface to the water stratum. Generally prefer to sow in the early spring, after danger of frost is past. Have had excellent success sowing on sod the first season, after doing thorough work in preparation of seed bed with discs and harrows. Sowed 20 pounds per acre, and found it best to drill two or three inches deep. When weeds are about matured, cut with mower, and clean off the land. After the first year, there is no particular danger from the frost here. The time to irrigate is immediately after each cutting; flood the land three or four inches deep, and do not allow water to stand on the ground longer than 24 to 36 hours, to avoid scalding the plant. I irrigate from stream, and find that the quantity of water the first year does not differ from that required afterward, as water always increases production. There are three or four cuttings, yielding one to two tons per acre each. Cut for hay when the bloom is brightest, and, if properly cured and stacked, it will keep as well as any other hay. Cut for seed when there are more ripe than green, and there will be more danger in leaving longer than in cutting it; cut with self-raker, and stack when well cured. An ordinary yield is about five bushels per acre. The common thrasher is fairly satisfactory, and the cost for thrashing is \$1 per bushel. The maximum cost of alfalfa in the stack is about \$1 per ton, irrigation costing \$2 per acre. To bale costs \$1.25 per ton, 100-pound bales being preferred. The average selling price has been \$3 per ton, and for seed \$3.50 per bushel. I consider alfalfa much superior to clover or timothy; cattle fatten on it readily, and as a preliminary feed for cattle to be finished on corn, it is unsurpassed. The pasture yield is greater than that of clover, and it is superior for swine; it bloats cattle badly. Irrigation increases the yield greatly, and the feeding quality is not impaired. There must be a subsoil that the roots can penetrate, or else the plant is not very thrifty. Under fair conditions, it attains its best yield after one year, and I find it almost impossible to kill it; so to rid land of it is difficult. Though hard to plow, it makes excellent green manure—equal to clover. The straw makes feed practically as valuable as that cut before ripening.

FORD COUNTY.

John H. Churchill, Dodge City.—Alfalfa is superior to any other feed but grain. My land has paid as high (net) as \$40 per acre yearly—never less than \$25. My four years of experience have been with 100 acres of "second-bottom" land, with loam surface and hardpan and dry clay subsoil. In the lowest places the soil is moist all the way to water, which is found at a depth of from 6 to 12 feet, but in others it is dry for two or three feet. With old ground, as free from weeds as possible, seed 20 pounds per acre, broadcast; harrow in well, and roll; or, seed with drill having alfalfa-seed attachment, 15 pounds per acre. Preferable time for sowing is from March 15 to April 20 or May 1. The best stand I ever secured was sown in the latter part of August, 1890. It bloomed and made good pasture that fall. But that cannot be done every year, as I have missed three times since on that kind of sowing. Spring is the most sure. Cut the weeds when about knee high. Should the season be favorable, cut a light crop of hay September 1, and pasture later in the fall. It does not winterkill here. Have four cuttings, averaging one ton per acre each, without irrigation. Mow for hay on the earliest of the bloom, and for seed when the pods average a rich brown. Heretofore the second cutting has been preferable for seed, but this year the first is. When not too heavy, the hay will cure in 1½ days, and I stack with sweep rakes and stackers. It will not mold if stacked fairly dry, but will heat while going through the sweat. Cut for seed with a self-

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rake mower and dropper. An ordinary yield is five bushels per acre. The common thrashing outfit, with clover-huller attachment, does very good work, and the thrashing and cleaning cost 50 cents per bushel. I estimate the total cost of hay in stack as about 75 cents per ton. It is superior to clover and timothy for feeding, and will pasture at least 30 per cent. more stock than clover will. If not irrigated, it is good pasture for horses, as then it is not so washy, and the hay is finer. Animals bloat sometimes, when pastured on rank alfalfa that is wet, or if they get to water soon after eating it. Cattle and sheep should be kept out of the growing alfalfa while it has frost or a heavy dew on, and after hearty grazing on a rank growth should not be allowed to water for several hours. If, however, they are found bloating, stick with a knife or trocar in paunch, on the left side, one span of hand from hip bone. Hay ripened and thrashed for seed is worth about one half as much as that cut earlier for hay alone. On "bottom" lands, the character of the soil does not affect the longevity of the plant. A good yield is attained the second year, under favorable conditions, and it improves every year after that. It will be well to experiment in a limited way on the high prairies having clay subsoil and no irrigation, as the success of alfalfa-growing on the uplands is somewhat problematical.

GRAHAM COUNTY.

A. P. Langley, Morland.—I have four acres of alfalfa, growing four years, but had several years' experience prior to sowing this. The land is "second bottom," both sandy and loamy soil. Well water is found at 18 feet, and the ground is entirely free from hardpan. Ordinarily, in well digging, the soil is found moist all the way down to water. My experience is, that the preferable time to sow is whenever the ground is in the best condition, from April 1 to June 1. The first year's yield amounts to practically nothing, but the ground should be cut over from two to three times, to keep the weeds down, which should be left as a mulch. I do not irrigate. I usually cut twice the second year, and three times each year following. The average yield is 2½ tons per acre. The first and third crops should be cut for hay, and the second for seed; or, if a very favorable season for alfalfa, four crops can be cut. I have never known alfalfa to winterkill. Whenever the pods turn yellow it should be cut for seed, and, in good drying weather, it should be left on the ground probably a half day, or until it wilts, before raking or stacking. If properly cured before stacking, it will not heat or mold, and when stacked out of doors it should be covered (usually with other hay), to prevent the rain from penetrating. I estimate the total cost per ton of my alfalfa, in the stack, at \$1 to \$1.50. My alfalfa yields from 10 to 12 bushels per acre, and the cost for thrashing is from 45 to 50 cents per bushel. Alfalfa hay is worth nearly double any other I ever used. I have seen 100 hogs turned on a field of 12 acres, and taken off before frost, and a good crop harvested. I believe alfalfa a better food, generally, than any other clover that grows. In thrashing, the leaves are shattered off, but stock seem to relish the straw almost as well as that cut earlier for hay. It takes about three or four years to attain its best yields. It is my fear that alfalfa will never be a great success on the high prairies, yet I believe it is going to bring northwest Kansas to the front, as it can be raised on low ground with little or no rainfall, and for all uses it is one of the best crops grown. I know of several instances where farmers have almost made a fortune by raising hogs on alfalfa, and by selling the seed. I am satisfied that all farmers who have low ground can do much the same.

GREENWOOD COUNTY.

F. G. Thrall, Thrall.—I have had 10 years' experience with alfalfa, and now have 50 acres. The land is "bottom," with surface and subsoil of loam. By digging 10 to 20 feet we reach well water. After deep plowing and harrowing, one-half bushel



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of seed is sown to the acre, and harrowed in with a common tooth harrow. April is the preferred month for seeding. During the first season I keep the weeds cut, and, if the season is good, have one fair crop of hay. After the first year, unless the alfalfa is pastured too late in the spring, I cut four crops of hay, averaging 1½ to 2 tons per acre. The plant is not particularly liable to winterkill. For hay, I cut when in full bloom, and, the day after cutting, rake up and shock, to cure two or three days. I stack in large ricks, and fill my barn. If properly cured it keeps well. The estimated cost of the alfalfa in the stack is about \$2.50 per ton. For feeding farm animals, one ton of alfalfa hay is worth two of timothy or clover. As pasturage for swine or cattle, it is worth twice what red clover is. I have pastured horses and cattle on it in all stages of growth, but have never had any stock bloat. Alfalfa seems to attain to its best yields three or four years after seeding, and the older it gets the better it becomes; so that on good land it needs no reseeding. I consider it the best and most profitable crop I can raise here. It makes the best hay, since stock will fatten on it alone; it makes the best pasture, and the most of it; and, when a farmer gets a good stand, it is a permanent crop, as it does not freeze out, and hogs cannot root it out.

GOVE COUNTY.

H. C. Williams, Grainfield.—Have had eight years' experience in alfalfa-growing; now have 50 acres; it is on all kinds of land, but the "bottom" and "second bottom," and sandy soil do the best. Most of the subsoil is sandy, and the crop does not do well where there is hardpan. It is necessary to dig 3 to 26 feet for well water. I plow deep, in the fall, disc and harrow well in the spring, sow in April, 15 pounds good seed per acre, about two inches deep. Sow one-half bushel of barley per acre with it, to keep down the weeds, and sometimes cut a hay crop in the fall, but get no seed the first year. It does not winterkill here. After the first year, cut about June 1 for hay, August 1 for seed, and September 15 for hay. Mow when in bloom for hay, and let cure 6 to 12 hours. Stacks covered with prairie hay will not heat nor mold in this climate. When most of the pods are brown, cut for seed, put into cocks as soon as possible, and thrash when dry. Have raised eight bushels of seed per acre, but the average yield is about five. Thrashing and cleaning cost 75 cents per bushel, and I consider the clover huller the best thrasher. In 1890, I had three acres, from which I cut 21 tons of hay and thrashed 25 bushels of seed. Alfalfa hay is better than any other that I know of; the pasturage is good for horses, and for cattle it is one-third better than red clover. Sheep and cattle sometimes bloat, and the only remedy I know of is to stick them. Hay grown without irrigation is more valuable as feed than that irrigated. If properly used, the straw is about as valuable as the hay cut earlier. After one year from seeding, the crop yields well here, and gets better every year so far. It is the best crop for bottom lands in western Kansas, but I would not advise anyone to sow on upland, unless in sandy soil.

HAMILTON COUNTY.

Thos. H. Ford, Syracuse.—I have grown alfalfa for five years, and have 300 acres. The land is "first" and "second bottom," with some black loam and some very sandy soil. The black loam has a clay subsoil, and the other is all sand. To reach well water it is necessary to dig 6 to 15 feet. The soil is all made moist by irrigation, but after the second year this is not necessary, as the alfalfa roots go to water. We prepare the land just the same as for clover or timothy, and sow 15 pounds to the acre, broadcast, with seeder. We prefer to sow in April, but have good results from sowing in September, in which case it comes up in the spring before the weeds do. After the spring sowing, the first crop hardly pays for cutting as hay, on account of the weeds, but should be cut by the middle of July, and the weeds will

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give no more trouble. The plant is not liable to winterkill. We irrigate after each cutting, running the water over the crop as soon as possible, except in the case of ripening for seed, when no irrigation is used, when the plants grow rank, producing less seed and more straw. A part of the land is irrigated by a ditch, built from the river, and the remainder by an irrigation pump, which is set in the creek, and raises the water 12 feet. The pump is the "Menge," made at New Orleans, and throws 150,000 gallons per hour. If we irrigate well the first summer and fall, there is not half so much water required the next season. We have cut four crops each season, with 2 to 2½ tons to the acre at each cutting. The hay is cut when in full bloom, with a "McCormick" self-rake, then raked off in windrows, cocked, and allowed to stand 1½ to 2 days before stacking, or three days before thrashing. For hay, it is better to rake a half day after mowing and allow the alfalfa to cure in the cock, thus saving all the leaves. For seed, the hay is cut when the pods are all black, or dark brown. The second crop is best for this purpose, although we allow part of the first crop to go to seed, with good results. In stacking, I use a double-harpoon hay fork. I never had any alfalfa spoil in the stack. One dollar per ton covers all expense in the stack, and land is worth \$15 to \$20 per acre. My seed crop netted me over \$35 per acre, and I had two crops of hay besides. The yield of seed is 5 to 13 bushels per acre. The ordinary thrashing outfit is not satisfactory, and we use the "Birdsell" clover huller. The cost of thrashing is 50 cents per bushel.

Alfalfa hay is far better than clover for all kinds of stock, and I have fattened cattle on it in the winter just as fat as I ever did in Iowa on corn. Our hogs are all fattened on alfalfa, as we raise no corn. As a pasture crop for horses and sheep it is satisfactory and profitable, and it is far better than red clover for cattle, pasturing double the number of stock. As to bloating, it acts the same way that clover does. If stock stand for 12 to 15 hours with nothing to eat, and then break into the alfalfa, they bloat in five minutes. We stick them on the left side. There is a difference of \$1.50 per ton between the hay ripened and thrashed for seed and that cut for hay alone, and this is because the former is harder to handle. The best results are attained after the second year. Constant irrigation makes our ground hard, so we cut it up in the spring with the disc harrow, and that makes it as good as before. On high prairies, with clay subsoil, and no irrigation, alfalfa is not a profitable crop; but if we could irrigate our upland, and put in alfalfa, every acre would be worth \$40. Last year I saved 70 acres of the first crop for seed, thrashed 565 bushels, and sold it for \$4.75 per bushel. I can make more money on my land by farming it in alfalfa than can be made on any other land in the United States with other crops.

JEWELL COUNTY.

W. S. Chapman, Mankato.—Most assuredly I consider alfalfa a reliable and profitable crop for the high prairies with clay subsoil and no irrigation. The last two seasons have fully tested it. I regard it as the best crop we can produce in this part of the country, and intend to increase my acreage as rapidly as possible. We have cut fair crops on upland this year and last, making three cuttings in the season. More moisture would have been decidedly beneficial in increased yield, yet, notwithstanding our extreme dry weather, we have abundance of good feed, while almost all other crops are complete failures. My land is upland, with very stiff clay subsoil, and some few small spots of "gumbo." As a rule, except in an unusually dry time, the subsoil is moist close to the surface, and well water is reached at depths of 30 to 90 feet. Prefer to seed in the spring, as soon as safe from frost, after plowing to good depth and putting soil in best possible condition. I sow about 15 pounds of choice seed per acre with a drill, about two inches deep, and then, if the ground



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is dry and light, using a heavy roller. During the summer I mow the weeds twice and leave them on the ground as a protection, unless the alfalfa is very vigorous; then save the second cutting for hay. Unless in low places where water stands, it does not winterkill here. Each year after the first, there are three cuttings, yielding about one ton per acre each. Cut for hay as the plant is coming into bloom; when partly cured it is raked, and then left in the cock for three days before stacking. I prefer hay sheds with well-built roofs and ends, but open sides. It makes very little difference which crop is used for seed, aside from the conditions under which it matures. Cut with harvester or self-binder, the same as grain, and protect from rain. On land valued at \$25 per acre, the total cost of alfalfa in the stack, here, is about \$1.25 per ton. Seed has sold for \$4 to \$5 per bushel. For feeding, the hay is fully as good or better than clover or timothy; pasturage, for hogs, horses, and cattle, compares favorably with clover, and is, in fact, better for cattle. When turned in on wet alfalfa, or when it is in bloom, cattle that are very hungry are liable to bloat.

KEARNY COUNTY.

A. R. Downing, *Deerfield*.—Experience eight years, with 60 acres of alfalfa; upland, with open soil for several feet down, a little sand, and no hardpan; 50 feet to water; soil dry from top to within three or four feet of water. By way of preparation, a good seed bed suitable for any small grain; broadcast 15 to 20 pounds of seed to acre, and harrow twice; or, if ground is dry, drill with press drill. Middle of April is preferred for sowing, but any time will do after that to August 15. If sown in spring, mow weeds and alfalfa about middle of July. A good crop of hay, one ton or more per acre, can be cut the second time. Unless the growth is very good, it is not safe to leave for seed on account of other seed getting with it. It does not winterkill here at all. We irrigate once for each crop, as early as possible in the spring and after cutting; the water should be run on from three to six hours, and a whole day or night does not hurt it. The water is obtained from the Arkansas river. Old and new alfalfa require about the same treatment—the more water the more hay. I always cut three and often four crops after the first year, with an average, each cutting, of about $1\frac{1}{2}$ tons per acre. Cut for hay when about half in bloom, and for seed when the greater number of pods are black or brown; preferably of the second crop. For hay, cut with self-rake, cock as fast as cut, and stack as soon as dry. Hay should be cocked as soon as it can be raked, as the leaves are saved and the color kept better by curing in the cock. Hay should be dry when stacked, or it will heat; if stacking is followed by damp weather, the stacks should be covered. Total estimated cost of hay in stack is \$1.25 per ton. Cost of baling a ton in 100-pound bales is \$2. The size of a bale does not affect keeping qualities. Ordinary yield of seed is five bushels; cost of thrashing and cleaning, 75 cents. Most prefer a clover huller to the ordinary thrasher, as it leaves the straw in better condition.

Alfalfa hay is much better for all kinds of stock than clover or timothy; cattle get fat on it, and but little grain is needed with it for work horses. As pasture feed it is equal to clover, and the yield of one acre of alfalfa watered is equal to three of clover. For five years, I have demonstrated the fact that 20 hogs will thrive on one acre of alfalfa if it is kept moist. It is satisfactory and profitable pasture for horses and sheep, but not safe for cattle, as the loss from bloat is so great that few care to take the risk. A stick tied in the mouth as a bridle bit is a good preventive, the knife being the only cure for bad cases. Hay well matured is always best for work horses, being less washy. The market value of the straw is half that of hay, while its feeding value is fully two-thirds. As to yield, I can see no difference between the second year and the ninth, and my opinion is, that alfalfa well cared for will do well for 20 years or longer. It is hard to plow up; a sharp plow lessens the difficulty.

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Plowed under for green manure, I think it as good as red clover. I have no faith in alfalfa outside of irrigation, except where water is four to eight feet from the surface; it is a plant that requires much water, and it roots so deep that an ordinary good rain seems to do it but little good. I consider it the best all-around feed grown. I thrashed last season eight bushels per acre, and sold for \$4.65 per bushel. It will bring on an average, seed and hay, \$20 per acre. I am seeding more every year, and shall not be satisfied until I can show 300 out of 480 acres in alfalfa. My observation is, that the farmers who have the most alfalfa are the ones who have the largest bank accounts. It is certainly king in western Kansas.

LANE COUNTY.

D. E. Bradstreet, Dighton.—I began seven years ago, and now have 30 acres. The land is "bottom" and "second bottom," with loam surface and dark, porous subsoil. On the "bottom," well water is reached at six feet, and even, in the driest time, the soil is moist below eight inches. In my opinion, backsetting new land is the best method for starting alfalfa. We sow 25 to 30 pounds of seed to the acre, broadcast, and harrow well. Without irrigation, seed can be sown here about the first of April. I sow with barley or oats, and harvest so as to leave plenty of stubble for winter protection, but do not cut alfalfa at all the first season. It is not liable to winterkill, but some such protection is beneficial. After the first season, we cut three times, obtaining 1½ tons per acre at each cutting. Hay is cut when the plants are fully in bloom, and, after curing about one day, is stacked like prairie hay. If properly cured, there is no particular danger of molding or heating. For seed, I wait until the seed is about two-thirds ripe, then mow, rake and thrash with the ordinary thrashing outfit. Ordinarily, alfalfa will yield 6 to 10 bushels of seed to the acre, and this costs, for thrashing and cleaning, 50 cents per bushel. As food for farm animals, alfalfa hay is of about the same value as clover or timothy. There could be no better pasture for horses and sheep, while for swine and cattle, alfalfa is equal to clover. About 15 hogs can be pastured on an acre, but if mowed for them, an acre is sufficient for 30, since it grows so much faster if not tramped over. In the spring, there is danger of bloating, if animals are pastured on rank alfalfa. The time in the pasture should be gradually increased at first, and during the summer there will be little danger. Ripe alfalfa thrashed for seed is of about half the value of that cut for hay alone. Our greatest difficulty in alfalfa-growing is in getting a start, but I have failed only one season out of seven. It is a paying crop for Kansas, especially in the "bottoms" of the western part of the state. I have wintered and summered 40 hogs this year principally on alfalfa, and they are thrifty. It is the best milk producer I have ever seen. Everything eats it, even the fowls, and I think a man could make money raising geese on alfalfa. Last year, I thrashed 104 bushels of seed from 10 acres, and sold it at \$4.80 per bushel, besides having two cuttings of hay yielding about 2½ tons to the acre.

LINCOLN COUNTY.

D. B. Day, Lincoln.—I sowed eight acres of alfalfa five years ago, and now have 18 acres, on creek "bottom," sandy loam, with clay below the first two feet, and well water at a depth of 20 feet. I prepare the ground as for wheat, and have always sowed broadcast, about 20 pounds per acre, and harrowed lightly. I think if put in with drill, eight pounds would be enough, drilling four pounds each way. The first of April or first of May is a good time to sow. Mow when the weeds are about six inches high, and rake them off if thick; mow twice afterward, the last cutting making good hay. If the plant gets a good start in the summer, there is little danger here from frost. I cut first for hay (after first year), obtaining about 1½ tons per acre; then for seed, and again for hay, obtaining about one ton. For hay, I mow

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as soon as fairly in bloom, and for seed when the pods brown. Let hay lie 24 hours before raking, then put in barn or stack, and top out with sorghum or prairie hay, as it does not turn water very well. With land valued at \$20 per acre, the cost per ton of alfalfa in the stack is about \$1. Thrashing and cleaning costs about \$1 per bushel, and a clover huller is best for this. Alfalfa hay is about equal in value to clover or timothy. For hogs, as hay and as pasturage, it is better than clover; with plenty of rain, I think four acres would give 100 hogs all they could eat. They will do better the first six months than on corn, with one-quarter the cost.

MARION COUNTY.

Thos. M. Potter, Peabody.—Have had about six years' experience with from 5 to 100 acres. The soil is alluvial "bottom," mostly black for 12 inches, and shading into a yellow clay as it grows deeper. Well water is reached at a depth of 20 feet. The best preparation here is fall plowing, with a thorough pulverization of the surface only in the spring. Sow in the spring, after vegetation has started well and danger of frost is past, 22 pounds of seed per acre, broadcast or with press drill, about two inches deep. After the alfalfa has a good start, mow the weeds. Must be governed by the season and the condition of the ground as to when and how often to mow. Have obtained from one-half to one ton of hay and weeds per acre the first season. It does not winterkill here. After the first year, there are three crops, averaging about one ton at each cutting. For hay, cut when about two-thirds in bloom; let stand two to six hours, rake, and let stand about 24 hours in the best curing weather, and then stack, in any kind of stack that suits convenience and machinery. If properly cured, it is not liable to mold. When the majority of seed bolls are ripe, cut for seed, with a self-rake, and stack when dry. An ordinary yield is 2½ bushels of seed per acre, and the cost of thrashing is \$1 per bushel; the ordinary thrasher needs a clover attachment. Estimated cost of hay in the stack is about \$2.50 per ton. Baling costs \$2 per ton. The size of bales makes no difference as to keeping; bales weighing 80 to 100 pounds are most common. The food value per ton is about equal to that of clover, but the yield per acre is double. I am satisfied, from an extended observation in Kansas and Colorado, that hogs on alfalfa pasture need a little grain to do best, especially if one expects to fatten them. Alfalfa is excellent for horse and sheep pasture, and for cattle I consider it worth twice as much as red clover, acre for acre. The straw is about one-third the value of the hay. At the third year from seeding, the yield is at its maximum. I am doubtful of this crop succeeding on high prairie having a clay subsoil.

MEADE COUNTY.

R. E. Steele, Meade.—I commenced growing alfalfa in 1885 with 40 acres, and now have 400, on "bottom" and "second bottom," with sandy loam soil one to three feet deep, and the subsoil of sand, with a few spots of clay. To a depth of one or two feet, the soil sometimes becomes hard; but below that it is moist, and water is reached at a depth of 6 to 10 feet. I prefer to sow in the early spring, between the 1st and 15th of April, on land prepared as for wheat. After filling up the low places with a leveler, I seed with press drill, about two inches deep, 10 to 12 pounds of seed to the acre. When sown broadcast, 20 pounds to the acre is not too much. The weeds are cut in July, before they become hard, and after that there is good fall grazing; but I have never saved hay or seed the first season. I irrigate two or three times a year, as soon as each crop is removed, with water from a creek which furnishes about 1,200 gallons a minute. The first time land is irrigated it requires twice the quantity ever needed again. My estimate is, that we must use about 125,000 gallons per acre, at each irrigation. Much of this quantity is wasted by running into gopher and other holes, sometimes reappearing a mile away, in a flowing

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well. The weather and water are both too cold for irrigation in April and May, and the water rather retards than promotes growth. Fall irrigation, winter snows and spring rains obviate the necessity of supplying water for the first crop. When seed is desired of the second crop, which is usually the choice for that purpose, results are most satisfactory if only rain is depended on for moisture, as too much water produces such a rank growth that none but the blooms on the extreme tips of the plant mature. The second year after seeding, the plant is at its best, and, on sandy loam, it lives forever, though in clay it is short lived. There are three or four crops a year, yielding from one to two tons per acre each. When in full bloom the hay is cut, and it should stand in the windrow or cock until dry; in June, it requires a week; but in July or August, hot winds will cure it in a day. I put in stacks 15 feet wide, 10 feet high (to square), and as long as desirable. If dry, it keeps well. With \$50 valuation per acre of land, the alfalfa in the stack costs \$2 a ton, and, in the local market, it has sold for several years at \$5 a ton. Seed is harvested when most of the pods are brown, cut with a mowing machine, raked as soon as cut, and stacked with as little handling as possible. The ordinary thrashing outfit, in ordinary hands, is not satisfactory for this crop; but a good separator, well managed, saves all the seed. An average yield for the past six years is five bushels to the acre, and the average price of it has been \$5 per bushel. The straw is worth about one-fourth as much as the hay. Alfalfa hay will fatten horses and cattle, and, for this purpose, is almost equal to corn. The pasture is the best I know of for horses. Cattle on the pasture bloat badly in the spring. To rid the land of it requires a team and plow strong enough to plow hazel brush, in the summer. On the uplands, in this county, alfalfa will grow only when irrigated.

NORTON COUNTY.

C. D. Bieber, Calvert.—I have 43 acres of alfalfa, and my experience extends over 12 years. The soil is "second-bottom" loam, and some of the soil has washed off to the subsoil, which is "gumbo" to the depth of three feet, below which is a magnesia limestone hardpan, three feet deep. Dig 40 feet for well water, through soil which is dry for about three to five feet, beginning four feet below the surface. I find that it is best to plow at least two inches deeper than usual, in order to break the crust that forms under the plowed soil; then harrow well before sowing, 20 pounds per acre, and harrow again lightly, to cover the seed not more than two inches deep. About the first of April is preferred for seeding. I cut the weeds once or twice, as required, and seldom fail to get a clean crop of hay—about 1½ tons per acre—the first season. It has winterkilled for me but once, and then to no great extent. After the first year, there are three crops of hay, or one each of hay and seed, with fall pasture. Hay is cut when the first blossoms form pods, and seed when the majority of them are ripe, the crop chosen for seed depending on the season. I invariably cut hay in the morning, and stack in the afternoon, and have no trouble with mold or heat, if there is no dew on the hay when put in the stack or barn. An ordinary yield of seed from one cutting is four bushels, but when wanted to sell there can be two crops of seed. The cost for thrashing has been 40 cents per bushel of 60 pounds. In my judgment, alfalfa excels both clover and timothy for feeding farm animals. It will not stand pasturing in the spring, nor in dry weather, and so, as regards the plant, it is not so good as red clover, while it is better than the clover for cattle feeding. I have had no animals bloat, and have pastured at all stages of growth and all seasons. Alfalfa straw is as good as the hay, and for horses it is better, since it is not so washy. The plant reaches its best yields about the fourth year, and I have some that is just as vigorous as it was eight years ago.

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OSBORNE COUNTY.

Jerry Quigley, Pleasant Plain.—Alfalfa is a good paying crop for hay, seed, and pasture, on good, level upland, and I consider it the most profitable that can be grown in western Kansas, more especially for hog pasture. My experience extends over eight years, with 18 acres. This is part upland, with stiff clay subsoil, and water at depth of 40 feet; part "bottom," with a rich, dark soil, and water at 15 feet. Dry soil begins at top and extends down to within five or six feet of water. Plow deep, harrow once, seed 20 pounds per acre, harrow twice, and roll with heavy roller. I have sown the last of March with success, and others here have had as good results from seeding the last of August or first of September. When the weeds are six or eight inches high, mow, and let lie on ground. The last of August, I cut for hay, but get no seed until the second crop of the second year. At first cutting of second year, I get one ton of hay on upland, and 1½ tons on bottom; the second crop yields two bushels of seed per acre. There can be three cuttings for hay, and good fall pasture. Hay is cut just as it begins to bloom, allowed to cure 36 hours before raking, and then 48 hours before stacking in ricks or round stacks, topped with material that turns water well. It is liable to mold and heat. Cut for seed when the majority of pods are black and others turning yellow, handling like any other grain crop; but I prefer thrashing out of the field, and from the second crop. The total cost of the alfalfa in the stack is about \$1.30 per ton. My average yield of seed has been two bushels per acre. Thrashing and cleaning costs \$1 per bushel, and the common machine saves not more than half the seed. Some of my neighbors have thrashed five bushels of seed per acre. I consider the hay better than timothy for horses and cattle, and it is extra good for milch cows. One acre, on good soil, will pasture 10 head of hogs (from 80 pounds upwards), and keep them in good growing condition. The pasture is excellent for horses, but the hay is not considered good for driving and coach horses, though it is for draft horses. Hogs can be wintered well on the hay, which, for them, should be cut while young and tender, before it begins to bloom. Green alfalfa will go twice as far for swine if cut every morning and put in the hog lot, as long-continued pasturing makes the ground too hard for the best growth of the plant. My stand is eight years old, and is as good as ever. The straw is worth about half as much as the hay.

POTTAWATOMIE COUNTY.

Peter Noll, Myers Valley.—I have been raising alfalfa eight years, averaging about 30 acres, on upland and loam, with a subsoil of yellow clay and limestone. Have to go about 50 feet for water, through loam, slate, and limestone. To prepare ground, plow in the fall; sow 15 to 20 pounds of seed per acre, four inches deep, with a press drill, any time in April or May. During the first year it should be cut and allowed to lie on the ground. We do not irrigate, and have no trouble from winterkilling, if hogs allowed to run on it are ringed. We cut for hay when in bloom, and use the second crop for seed, cutting with a side-delivery machine. Cut for hay, it should be allowed to cure until it begins to turn yellow; then rake into windrows, and before it colors in the windrows, bunch it; stack in stacks eight feet wide, height to suit, topping out with millet or corn fodder. The ordinary yield is two bushels of seed per acre. The cost of thrashing and cleaning is \$1 per bushel. Alfalfa is considered worth about 50 per cent. more than timothy or clover for general feeding; for pasturing hogs, it is worth nearly double red clover. I have kept 100 hogs on five acres of alfalfa pasture. When cattle are allowed to run on alfalfa from the time they are calves, they will not be affected by bloat. The straw is worth about half as much for feeding as the hay. The crop is about its best here the second year after sowing. No trouble in ridding the ground of alfalfa when so desired. Western Kansas

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cannot do better than to raise alfalfa. I have pastured, all summer, every year for five years, 150 hogs, with early spring and late fall pasture for 50 head of horses and cattle, besides getting 30 bushels of seed and 40 tons of hay each year, from 30 acres.

RAWLINS COUNTY.

M. A. Wilson, Atwood.—About seven years ago I began, and have steadily increased to 100 acres, on "first" and "second bottom," with loam soil, not sandy, but of an emery nature, and with a fine emery clay subsoil. On the "first bottom," water is reached by digging 10 feet through soil moist all the way; on "second bottom" it is necessary to dig 17 feet, and there is a dry streak four feet thick, beginning about two feet from the surface. Have ground in good cultivation, plow deep, in the fall, if wet enough; sow seed broadcast early in the spring, about one-half bushel per acre, harrow thoroughly, making ground level, and then roll. When alfalfa and weeds are well up, cut and leave equally distributed over the ground, repeating as often as needed during the first year; rake and haul off the next spring, then renew in any thin spots, and harrow all over well. In a dry altitude there is no particular danger from frost. Three cuttings of hay per season yield about four tons; when seed is ripened once there are only two cuttings. The first cutting is preferable for seed, which should be mowed when nearly all the pods are brown, and stacked in ricks as green as it will keep. Hay is cut when the field is in full bloom, cured one-half to three-quarters of a day, and put in large ricks out of doors; unless green it will not mold. Estimated cost of hay in the stack is about \$1.25 to \$1.50 per ton. The yield of seed is 3 to 10 bushels per acre; cleaning and thrashing costs about 75 cents per bushel, and the average selling price has been about 10 cents per pound. An ordinary thrasher in most cases gives fair satisfaction, but a clover attachment is better. The hay is at least one fourth better than clover or timothy for fattening qualities, and horses are not affected with heaves as they are on timothy. For pasturing hogs, it is at least 50 per cent. better than clover; 10 or 12 hogs can run on it from April 1 to November 1; if the hay is mowed and fed, it will be sufficient for 40 head. I let my hogs run in the field and feed corn out of a self-feeder; they eat about one-half as much corn as they would if kept in pen, and gain about 1½ pounds per day, if they have plenty of good water. It is good for horses, and for cattle is 50 per cent. better than clover. The straw is of about two-thirds the value of hay for feeding. I had 14 acres in the dry year of 1890, which yielded about \$800 profit in hay, seed, and pasture. I did not irrigate.

RENO COUNTY.

J. B. Brown, Hutchinson.—Six years ago, I sowed 120 acres of alfalfa, and this year 300 acres more. The land is partly "bottom," and upland, with sandy loam, and clay subsoil. Water is found about 10 feet down. Any time in the month of April is good for sowing, and May is all right. I plow the land well, harrow it, and then let it settle for a few days. Have sown 18 to 20 pounds of seed per acre, broadcast, with grass-seed sower, and then harrowed well. On old or foul ground, I think it necessary to mow the weeds at least twice during the first season. Alfalfa sowed on new ground, in April, has cut for hay this season 1½ tons per acre. I mow three times, after the first year, for hay, or once for hay and once for seed. Cut for hay as soon after the blossoms fall as possible, and for seed when most of the bolls are ripe, preferably of the second crop. I have mowed for the seed crop with a common mower; raked in windrows soon after cutting, and thrashed it in about a week. Hay cures in one or two days, and I have had no trouble with molding or heating. I estimate the cost of alfalfa in the stack as about \$1 per ton. The yield of seed is five to seven bushels per acre, and the cost for thrashing and cleaning is about 75 cents per bushel. I use the ordinary thrashing outfit. The hay I consider

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worth twice the price of prairie hay. For farm animals, I consider alfalfa hay much richer food than either clover or timothy, and it is much richer pasturage for hogs. One acre of good alfalfa will pasture 10 head of hogs, and they will keep in good stock condition without grain. It is profitable pasture for horses and for cattle; I prefer it to red clover or timothy. Have no cases of bloating. The alfalfa straw is much better than prairie hay. After the second year, the alfalfa is best, and I have some sown six years ago which is good yet. Bottom lands will produce much more hay or seed in a dry year than will uplands, but I find some good alfalfa on the uplands. It is the best crop grown in this part of Kansas. I have known it to make \$60 per acre, in one season, from the hay and seed crops.

RICE COUNTY.

C. K. Beckett, Raymond.—I had four years' experience with 25 acres of alfalfa, without irrigation, grown on "bottom" and "second bottom." The surface is sandy loam, and the subsoil sandy and clay, with some "gumbo" on the heavy land. All that I sowed on the "bottom" died after two years, as it was too near the water. By digging four to eight feet water is reached, and the soil is moist all the way. I plow deep and harrow well; sow 20 pounds per acre. Have also drilled some, and like that method. Seed should be covered 1 or 1½ inches—not over 2. Preferable time for sowing here is from 1st to 20th of April. I keep mowing the weeds off, and leave on the ground, while small. As soon as in bloom the hay should be cut, and it must be well cured before it is stacked or put in barn; two to four hours is sufficient time to let stand before raking, and it cures in the cock. The second crop is best for seed. Cut with a header, drop in piles, and thrash as soon as cured. Land, before it is set to alfalfa, is valued at \$20 per acre, and the estimated cost of the hay in stack is \$1.50. One ton of alfalfa hay has more strength than two tons of clover or timothy. For pasturing swine, it is worth three times as much as clover, and will feed twice as many cattle; is also fine for horses. I had 30 sows raise 150 pigs this year on 1½ acres. Now (September) the 150 pigs are running on it and it keeps ahead of them. My alfalfa has grown better every year, except where too near the water. I think the straw equally as good as the hay cut earlier.

BUSH COUNTY.

B. F. Coughenour, La Crosse.—My experience with alfalfa extends over six years, on from 10 to 40 acres of upland loam with hard clay subsoil, with well water at a depth of 40 feet. Deep plowing is good preparation for seeding, and subsoiling would be an advantage. Sow 25 pounds to the acre, broadcast, harrow, and cross harrow, and then roll the ground well. Preferred time for seeding here is from middle to last of April. If on old and weedy ground, it is well to set the sickle bar high and cut weeds before maturity, leaving for mulch. In a wet season there may be another cutting. No danger of winterkilling here. After the first season, there are two or three cuttings a year, depending on the rainfall, yielding about one ton to the acre each. When bloom is matured, cut for hay, raking in the evening of the same day. Stack in long ricks. It is liable to mold if put in too green. For cows, I prefer alfalfa hay to either timothy or clover; for horses, it is as good as clover, but not as good as timothy. As pasturage for swine, I consider it about equal to clover. It makes fine pasturage for horses, and for cattle it is much better than red clover. I think it the best crop for pasture and hay that we can raise, and would recommend that every farmer have from 10 to 30 acres sown along "draws" or on depressed land. It will pay. Ten acres of alfalfa will keep 100 hogs, and make more money than anything else that I know of in the farming line.

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RUSSELL COUNTY.

Thomas Sutton, Russell.—Have seven years' experience on from 60 to 300 acres of "first" and "second bottom" land, with sandy loam surface. The subsoil is, in some places, like the surface for several feet; some sandy, and some a little clayey. Well water is found at a depth of 35 feet, and most frequently in the two years past, in this county, the soil has been found to become drier as we went down, until the water was reached. Corn land, listed, was left very clean in the fall, and cleaned off in March and April; seeded with hoe drill, 10 to 12 pounds to the acre. Seeding may be done here from April to August, if the rainfall is sufficient. Cut in May, as a cultivation and to destroy the weeds; six weeks to two months later, cut for hay. If the ground is moist, there may be two hay crops, giving 1½ tons per acre for the season. It does not winterkill here. There are three cuttings each season after the first, and, if very wet, four. For cattle it is cut when in full bloom, and for horses when going out of bloom. I rake in windrows after the machine, when hot enough to wilt the leaves, cock, and let cure in the cocks. Stack about six tons in the stack, and never had any spoil or lose leaves or color. The ordinary yield of seed here is two to four bushels, and the thrashing costs \$1 per acre. We have nothing but the wheat thrashing machines, but an honest, capable man can clean the straw and seed well with them. For farm animals, timothy and clover will not compare with the alfalfa hay. In past years I pastured cattle and made fine gains, but lost the stand to weeds; never had a case of bloat. I keep swine on it in summer, and on hay in winter, and am not ashamed to show them at any time. It pastures about 10 hogs to the acre, if cut once or twice during the season. In Colorado, the preventive of bloat is to keep the cattle off the pasture, and I infer that the irrigated alfalfa differs from that not irrigated, in causing the bloat. The thrashed straw is eaten entire, with relish. There is no difficulty in ridding land of the plant, and it is good green manure when plowed under. The crop is better than any other known in western Kansas, on any of its soils or elevations. The ground must be clean for two years prior to sowing to alfalfa; on old ground the seed must be drilled, 15, better 10, pounds per acre. On fresh breaking, 20 to 25 pounds are needed; break the sod so that it lies flat; do not disc or harrow the first year; early the second spring, disc, and sow broadcast, to suit the stand you wish.

SEDGWICK COUNTY.

Edmund S. Carlisle, Mount Hope.—Eight years' experience, and have 200 acres on "bottom" and "second-bottom" land, with sandy and loam soil, and subsoil much the same, with spots of hardpan of various sizes. The soil is generally moist for five feet down (as far as I have dug), and water is found on the "bottom" at 12 feet, and on the "second bottom" at 36 feet. I do not irrigate. The land is prepared as for garden, as clean as possible from weeds, and with a good seed bed, and seeded 20 to 30 pounds to the acre, two or three inches deep. I sow broadcast, and harrow or broad cast in front of an empty drill and press behind. It is well to seed about the first week in April, as soon as the frost is gone and moisture and warmth assured; or else between the rows, at the last cultivation of corn. During the first summer it should be mowed frequently enough to keep the weeds from going to seed, and raked off or left on the ground according to the dry or wet state of the weather. If pastured too close in the fall, there is danger of winterkilling, in case of dry cold without snow. Sufficient stubble should be left to hold snow, as there should be protection for the crown of the roots. Mine has been regularly cut for seven years—first crop during the first week in June; the second (for hay), July 10; or for seed, August 10; and the third for hay, about the middle of September. The general yield has been 3,000 pounds of green hay to the acre, except for the third



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cutting, which gives only two-thirds of that. (I assume that hay shrinks one-third in drying in the stack.) For hay, I cut when well in bloom and when the leaves are beginning to fall off the stem; for seed, it is desirable to cut when there is nearest an average ripeness, as it ripens very unevenly.

I prefer the second cutting for seed, and mow with an old-fashioned self-dumper, as raking causes a great loss of seed. When it is fairly dry, it should be stacked with as little handling as possible, and will ordinarily yield three to four bushels per acre. The common wheat separator is not satisfactory; a clover huller is needed, although a huller attachment to a common thrasher makes a great improvement. The cost of thrashing is \$1 per bushel, including board of outfit, and of cleaning at 10 cents, and in the last three years the selling price of seed has been \$5 to \$7 a bushel. Hay should be raked 24 hours after mowing, or when wilted, and put in good-sized cocks for seven or eight days, and then stacked under cover if possible; otherwise, have a thick, heavy top of prairie grass. If it is dry and well cured when stacked, and the rain is kept off, it will not heat nor mold to hurt. Alfalfa hay is always worth twice as much as prairie hay. The straw makes good feed for cows, but horses do not like it or do well on it, and it is decidedly inferior to the early or late hay. My alfalfa land has returned me a yearly net average per acre of \$28 for the past four years, in seed, hay, and grazing, thus: First cutting of hay, when dry, one ton, \$6; second cutting, for seed, $3\frac{1}{2}$ bushels, at \$5, \$17.50; third cutting, for hay, dry, two-thirds ton, \$4, with grazing in early spring and late fall. The third cutting is the finest hay, and always worth more than the first, especially for horses. I have been successful in pasturing 10 spring pigs and their mothers on one acre of alfalfa, with 10 pounds of corn per day to each sow and her litter of pigs, selling the brood sows in August, and finishing the pigs on the same field, feeding five pounds of corn per day to them, with an average increase of one pound a day from birth. For horses, the pasture is most excellent. In time of heavy rains or very heavy dews, there is danger to cattle from bloating, and they should be kept away from it until the extreme dampness has dried off. My alfalfa continues to stool out for four or five years; was at its best the third year, and continued vigorous five years or more, needing light reseeding the eighth year, say 10 pounds to the acre.

THOMAS COUNTY.

Henry T. Knudson, Colby.—Seven years ago I began with five acres, and have increased to 35. My land is "second bottom" with loam soil, containing alkali, and the subsoil, except occasional spots of hardpan, is quicksand, which becomes very hard when dry, as if mixed with clay. Usually the soil is moist all the way to water, at a depth of 8 to 16 feet. I prefer to sow in April, although May will do, and to use land that has been in cultivation for several years. This should be plowed in the fall, and thoroughly pulverized before seeding. I always sow broadcast and harrow once afterward. As often as the weeds are a foot high they are cut, and left on the ground; there may be four cuttings of this kind, and sometimes the last will do for hay. The plant is not liable to winterkill here, and we do not irrigate. The third year from seeding gives a full yield, and I have never seen any deteriorate. It has seemed best to cut the first crop for seed when about three-fourths of the seed pods are black or brown. I cut with a mower in the morning, rake afternoon, and stack the next day; in other words, I get it into the stack as soon as possible. After the seed is harvested there will be one crop of hay, which should be cut when well in bloom, raked as soon as wilted, left to cure in the windrow, and stacked when about three-fourths cured. I put up in ricks about 14 feet wide. When no seed is saved there are three or four crops of hay, averaging $1\frac{1}{2}$ tons to the acre each. The cost of my alfalfa in the stack is about \$2.75 a ton. The cost of thrashing and cleaning

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seed is about 75 cents a bushel, and, while the ordinary machine wastes some seed, I have never tried anything else. An average yield is about six bushels per acre. The thrashed straw is worth about three-fourths as much as that not allowed to ripen. Horses and cattle grow fat on alfalfa hay, without grain. The pasturage is good and profitable for horses, and one acre of it is worth two of clover for cattle and swine. As nearly as I can judge, 10 or 15 hogs on one acre, for six months, would gain 10 pounds a month, or more.

WABAUNSEE COUNTY.

Robert Enlon, Wamego.—I have raised alfalfa for 12 years, and have 150 acres. The land is creek "bottom," and upland—ashy, mellow loam, with subsoil of lightish clay. Water is found 25 to 30 feet from the surface. In preparing for alfalfa, plow in the fall; sow as soon as the ground is in good condition in the spring, 20 pounds per acre, drilled in shallow. Keep the weeds mowed down the first year; if the land is good and the season favorable, a light crop of hay can be obtained the first year, of from one-half to one ton per acre. Alfalfa is not liable to winterkill. We do not irrigate. After the first year, from two to three cuttings are obtained, according to the season. The second year, it yields from one-half to one ton per acre each cutting; after the second, from one to two tons each cutting. Cut for hay when in full bloom; for seed, when it is ripe. The second cutting is preferable for seed, and should be cut and put in small bunches until thoroughly dry; then thrash as soon as possible. After cutting for hay, rake as soon as wilted, and allow it to dry before stacking. Stacks about 30 feet long and 12 wide, well topped out with sorghum, millet, or slough grass, are best. Alfalfa costs, in stack, about \$1 per ton; land is worth from \$15 to \$40 per acre. Baling costs \$1.50 per ton, bales weighing from 65 to 80 pounds. The seed yields from two to four bushels per acre; total expense of thrashing and cleaning, \$1 per bushel. An ordinary thrashing machine will do, but a clover huller is preferable.

I prefer alfalfa hay to either clover or timothy. As pasturage for swine, alfalfa is far superior to clover. On good land, 25 to 30 hogs can be pastured per acre; they will keep thrifty and in good order. It has been found satisfactory for horse and sheep pasture, and just as good as red clover for cattle. Cattle will bloat on rank alfalfa; turn them on full and allow them to remain; they will become accustomed to it. The straw is worth 25 per cent. as much as early cut hay, if not rained on before thrashing. The character of the soil must affect the longevity of the plant. I have some on dry land, sown 12 years ago, and still it is vigorous. It attains its best yields in from two to three years, according to the season. If any crop will do well on high prairie land, alfalfa will. Deep plowing and manure are advisable. I prefer spring sowing, but if sown in August, or the first of September, and a favorable season gives it a good start, it will be a success. I have found that a good top dressing of manure will benefit alfalfa more than it will almost any other crop. The more manure the more hay. I have had considerable experience with other tame grasses, but had no reliable success except with alfalfa. Young stock of all kinds, well sheltered and fed on alfalfa in winter, will do as well as on summer pasture. As rough feed for steers it is excellent; also, for milch cows, keeping them as thrifty as when on summer pasture. Hogs are also benefited by being fed alfalfa during the winter. I have cut six tons of hay per acre in a season.

WALLACE COUNTY.

Frank Neisgerber, Wallace.—My experience covers about eight years, with 32 acres, on "second bottom," some clay and some sand, with a subsoil of stiff clay. Water can be found at a depth of from 12 to 15 feet. In digging my well, the soil was perfectly dry to within four feet of water. The soil on which alfalfa is grown should be



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in thorough cultivation. I sowed in the early spring, 16 pounds of seed to the acre. Cut often, as it helps it to stool, and in that manner get ahead of the weeds. The plant is not liable to winterkill. I irrigate once for each cutting, immediately after the hay is taken from the field; irrigation water is obtained from a stream. More water is needed the first two years than later. After the first year I generally cut three times, but last year cut four times. Cut for hay when the bloom starts, and by the time of finishing the last will be in bloom. Cut for seed when the pods are black; the second crop is considered best for seed. In harvesting, rake what is cut in the forenoon in the following afternoon, and cock two days later. Stack, and cover with native hay. Alfalfa is somewhat liable to mold. Alfalfa is good pasturage for swine and horses. Cattle are the only animals I have known to bloat on it, and then only when it was wet with dew or rain. My field has been planted eight years, and proves better every year. One case has come under my observation of alfalfa being sown on upland, and it died out in two or three years.

WICHITA COUNTY.

Samuel Pugh, Leoti.—My experience with alfalfa began in the spring of 1888, and as I had just launched my boat on agricultural waters, I was governed principally by the advice of others. Following their advice, I sowed six pounds per acre. This was on "second bottom" a sandy loam, 25 feet above the water sheet. I sowed in April, and in October of the same year the tops were two feet high and the roots four feet deep. It proved to be seeded too light, and was weaker each year until 1891, when I plowed it up. Since that time, I have been sowing small patches almost every year, on low "bottom," sandy loam, four feet above the water sheet. The proportion of sand increases from the surface of the ground to the water, where it is almost pure sand. The soil is seldom dry to a depth of more than six inches; moisture then increases with the depth. I sow as early in spring as it is possible to get the ground in good condition. If the ground has been plowed the year before, it is better to work it shallow with a disc harrow than to plow it, but if it has been surface worked for some time without plowing, a hard stratum is formed below. In such case, it is better to plow deep; then, with drag and smoothing harrow, work the surface down firm and fine. If the ground has been kept entirely clear of weeds, the seed may be sown and harrowed in without a nurse crop, but if there is weed seed in the ground, it is better to sow barley, using one-half the quantity of seed necessary for a full crop of barley. The ground should be made clean and fine enough that the drill hoes can be set in a straight line, and not drag trash or clods, and leave all the furrows uniformly open. The drill should be run from two to three inches deep, and the barley will be covered about one-half that depth; then, with a hand sower, put on 20 pounds of alfalfa seed per acre, using none but the best. The seed can be covered by going over it with a light drag, or harrow with teeth turned back. The seed I sowed this spring in this manner was up as soon as the barley. I have never, until this year, done anything with the first season's crop; but this year the weeds have made a wonderful growth, and I have been cutting at short intervals, to keep the weeds from seeding. I have never noticed any winterkilling. It often remains green until the middle of December; the young stalks lie flat on the ground when cold weather sets in, and the stubble protects them from frost; but when hard freezing sets in, it disappears until the ground warms up in the spring. I have never attempted to irrigate it but once. I have a belt pump, and two horse power, arranged to water my garden and potatoes by flooding. I raise the water seven feet, and empty into a ditch. This small supply necessitates drawing up small ridges, 30 feet apart each way, which is a great damage to the young plants, as neither those that are cut off or covered up will grow again, besides making

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it very uneven to mow over. I have never cut more than three times, until 1893, when I cut four times, beginning June 20, July 20, August 20, and October 10. I cut in full bloom each time, except the last, when it did not bloom on account of cold weather, and I cut it to escape frost. Frost will cut the leaves off, and make it almost worthless for hay. The seed I saved was thrashed in a common thrasher, using a millet riddle; this secured it all and cleaned it well. I generally let the hay lie on the ground about four hours; then put in cocks, and let stand 24 hours; then put in stacks eight feet wide and long enough to hold three or four tons. If it goes in the stack pretty green, it may heat some, but it will not mold if let alone; if opened up, it will mold. The hay in the stack costs me \$2.25 per ton. The price charged for baling is \$2.25 per ton. Alfalfa is far better than any other hay or fodder I have ever used. I have grazed horses, calves and milch cows on it, and have never had a sick animal yet. I raised some hogs last year by cutting and throwing alfalfa in the pen; had only 30 bushels of corn to finish them on, and had 1,400 pounds of pork.

Alfalfa will fall behind red clover for green manure, as it is almost impossible to plow it under and keep it there. If the crowns are turned under, where there is any moisture at all, they will grow again; and, if turned under deep, it is almost impossible to get them killed out. I plowed a piece of heavy sod for potatoes. It took two years to get rid of the plants, and not a crown ever died that I did not pull out where the sun could dry it. I have seen several pieces started on the high prairies, but never saw anyone make a success of it yet; but, in all that I have had an opportunity to learn the particulars, the man was more to blame than the plant or the land, some of the land never having been plowed more than two inches deep. Alfalfa is destined to be the most reliable plant that has ever come into the state, for different reasons: The hot winds have never been able to make it drop a leaf during these two years of almost continuous dry weather; it will kill out any weeds in existence, and keep out any that try to get a foothold. The man who has his land all set to alfalfa will not lose much sleep on account of the Russian thistle. There are so many channels through which he can turn his crop into money, that he has a great advantage over the wheat grower. There are hay, seed, horses, cattle, hogs, and sheep. If he is handling one kind of stock, and finds it is going down, and another will pay better, he does not have to remodel his farm to change. It can be harvested and stacked in a windstorm that would carry prairie hay to an adjoining state. A leading agriculturist says: "Find what suits your locality, and stick to it." I have been eight years finding this out, and am going to put every foot of my place in alfalfa as fast as I am able. Alfalfa is "the way out;" it is a mortgage-lifter and a calamity-killer.



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FEEDING WHEAT TO FARM-ANIMALS.

ITS PRACTICE IN KANSAS, AND SOMETHING OF ITS BEARING UPON
AGRICULTURE AND STOCK-RAISING.

INTRODUCTORY NOTES BY THE SECRETARY.

In the news and agricultural papers, for a year past or longer, there have appeared occasional references to the fact that here or there some one was making himself an object of more or less good-natured wonder by using surplus wheat in lieu of corn as a stock food. It gradually became evident that, owing to the shortage and comparatively high price of corn, the considerable accumulations of wheat, its unprecedented low price, and generally unquestioned worth as a nutritive ration, a much greater aggregate of it was being withheld from the milling market and diverted to the new and widely differing purposes of meat production than there were any statistics available to verify. Appreciating the importance and interest attached to this new phase of the agricultural problem, its present connection with and probable future bearing upon both grain and animal production, but without disposition to unduly magnify the subject, or in any way appear to "boom" it as a new departure, the Kansas Department of Agriculture during the summer of 1894 undertook to obtain such definite, helpful information as it might from the people in every county of the state, showing to what extent the previous year's crop was being used as animal food, the preferred methods of preparation and using, its approximate cost of production in Kansas with varying yields, the ordinary returns from its use as a feed, its merits as a growth, meat and milk-maker, compared with corn—the chief staple and generally accepted standard in the central West—and such further practical observations as their experience might suggest. As a preliminary to this, there were procured the names and addresses of 1,000 wheat-growers, stock-growers, feeders, dairymen and others best situated and equipped for discriminate observing along the lines of this investigation. To these names there were sent, with a request for careful answers, the list of questions below:

QUESTIONS.

What proportion of last or the previous year's wheat crop in your county do you estimate as having been fed to farm animals? *Ans.*.....per cent.

Is it usually fed whole, dry or soaked, or ground? *Ans.*.....

Fed whole, about what percentage, if any, passes the animals without being masticated? *Ans.*.....per cent.

Does it appear as nourishing and healthful as corn? *Ans.*.....

Fed to hogs, does it prove as fattening, pound for pound, as shelled corn? *Ans.*.....per cent. greater.per cent. less.

How much live pork may be expected as a fair return per bushel of wheat fed to hogs? *Ans.*.....pounds.

At the same price per bushel (56 pounds of shelled corn and 60 pounds of wheat), what greater or less value would wheat have than corn as a grain for hogs? *Ans.*.....per cent. greater.per cent. less.

Leaving cost out of the question, is it found a satisfactory grain for growing or fattening hogs, and if not, wherein is it defective? *Ans.*.....

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Is the flesh of wheat-fed hogs as good or better than that from hogs fed on other staple foods, and in what respect does it differ? *Ans.*.....

If for any reason wheat is not found a satisfactory grain ration for hogs, what admixture of other grains will make it so, and in what proportion? *Ans.*.....

Is it being fed to work animals, and if so, is it used alone or mixed with other grains, and in what proportions? *Ans.*.....

Does it maintain the strength of working animals as well or better than corn or oats? *Ans.*.....

Do horses thrive or fatten upon it as well or better than upon corn or oats? *Ans.*.....

Used alone, as the full-grain ration, what quantity is given at a feed as compared with the quantity of shelled corn that would be used if corn was plentiful? *Ans.*.....

Is it fed to milch cows or other cattle, and with what effect as to milk and flesh, compared with corn? *Ans.*.....

At the same price per bushel, what greater or less value would wheat have than corn, as a grain for horses? *Ans.*.....per cent. greater.per cent. less. For milch cows? *Ans.*.....per cent. greater.per cent. less. For other cattle? *Ans.*.....per cent. greater.per cent. less.

About what is the present market worth per bushel of wheat on the farm where raised, in your county? *Ans.*.....cents per bushel. Of corn? *Ans.*.....cents per bushel.

At the present price of wheat as stated, and of pork, mutton, beef, and dairy products, can it be more profitably used as feed than sold to millers or shippers? *Ans.*.....

Would it be profitable, in your judgment, in case of needing the wheat or its equivalent for feed, to sell wheat at 40 cents and buy corn at 30 cents per bushel (or like relative prices) and do the hauling both ways? *Ans.*.....

From a feeder's standpoint, would it not be profitable to exchange good wheat at near-by mills for shorts and bran at current prices of each? *Ans.*.....

What is the customary toll or charge for grinding wheat, suitably for feed, at the public mills? *Ans.*.....toll.cents per bushel.

Is its value increased enough by grinding to overbalance such toll or expense? *Ans.*.....

If grinding on the farm is practiced, what is the method, the style of mill, and the cost per bushel? *Ans.*.....

What does your wheat cost per bushel in the bin (including 7 per cent. interest on value of the land upon which raised, also wear and tear of equipment), if the yield is 10 bushels per acre? *Ans.*.....cents; 15 bushels per acre,cents; 20 bushels per acre,cents; 25 bushels per acre,cents; 30 bushels per acre,cents; 35 bushels per acre,cents.

What is ordinarily the value per acre of your wheat straw, to use or to sell? *Ans.*.....

What is the present value of the land per acre upon which wheat is produced at the cost named? *Ans.*.....

Kindly state here any further observations you may have noted bearing upon the use of wheat as food for animals in Kansas:

WHAT THE REPLIES INDICATED.

The replies of about 400 of those who received the question blanks were of such a character as to make them very useful contributions, and, having been edited and condensed, a representative proportion of them is, with much other collateral matter, presented herewith in detail. From the answers and estimates of these observant and practical men who have viewed the subjects from the many divergent standpoints incident to a state with so large an area as Kansas, and a separation, in some instances, of possibly 500 miles, numerous very interesting averages and deductions are reached. Some of these are as follows:

Of the 24,827,523 bushels of winter and spring wheat raised in Kansas in 1893, there was used as feed for farm animals 4,059,323 bushels, or 16.4 per cent., Cowley and Sumner counties leading, with 297,044 and 407,606 bushels, respectively.

When fed whole, (perhaps more especially to hogs,) 25 per cent. of it passes the animals unmasticated and, hence, undigested and unassimilated—a shameful waste. The average of the estimates made by 81 correspondents in 20 counties is that more than 30 per cent. is voided without mastication; 12 correspondents, representing five counties, put it at 50 per cent. or above, and a few others name a higher figure, while 40, reporting from 12 counties, average at 10 per cent.

Three-fourths of those reporting, representing 50 counties, state that, pound for pound, wheat is superior to corn for fattening hogs (even with the one-fourth unmasticated) by 7 to 35 per cent.; the average of these indicating a superiority over

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corn of 16 per cent., while the average of the other one-fourth of the reports, representing 26 counties, indicates that it was considered of less worth than corn by 12 per cent.

To the question as to how much live pork may be expected as a fair return per bushel of wheat fed to hogs, the average of all the answers is 11 pounds, and the variations from 7 pounds, in a single instance, to as much as 20 pounds in one other; but nearly all put their figures at or above 10 pounds.

The averages of all the reports as to the cost of wheat, raised and in the bin, "including 7 per cent. interest on the value of land upon which raised; also labor and wear and tear of equipment," with different yields, show thus:

Yield of 10 bushels per acre, 56½ cents per bushel.

Yield of 15 bushels per acre, 48 cents per bushel.

Yield of 20 bushels per acre, 35½ cents per bushel.

Yield of 25 bushels per acre, 31 cents per bushel.

Yield of 30 bushels per acre, 27 cents per bushel.

Yield of 35 bushels per acre, 26 cents per bushel.

The highest and lowest average cost per bushel, given by counties, under the six different yields named, and the average value per acre, by counties, of the land upon which grown, are shown as follows:

HIGHEST AVERAGE.				LOWEST AVERAGE.		
COUNTY.	Yield per acre, bushels.	Highest cost per bushel, in cents.	Value of land per acre.	COUNTY.	Lowest cost per bushel, in cents.	Value of land per acre.
Wyandotte.....	10	88	\$50 00	Stanton	27	\$2 00
Wilson	15	66	20 00	Stanton.....	21	2 00
Wyandotte.....	20	52	50 00	Stanton.....	17	2 00
Miami.....	25	50	40 00	Stanton.....	16	2 00
Wyandotte.....	30	40	50 00	Stanton.....	15	2 00
Wyandotte.....	35	38	50 00	Grant.....	13	5 00

An average of wheat land values, as stated from all the counties, is \$19.35 per acre, and these valuations range from \$50 in Wyandotte, \$45 in Atchison and Brown, \$40 in Allen, Jefferson, Johnson, and Miami, and \$37 in Cowley, to \$6 in Cheyenne, Morton, Sheridan, and Sherman, \$5 in Finney, Grant, Meade, and Wallace, \$4 in Lane and Seward, \$3 in Haskell and Scott, and \$2 in Stanton.

In reply to the question, "What is ordinarily the value per acre of your wheat straw, to use or to sell?" the composite reply is 81 cents, the extreme range being from 25 cents in Thomas and Jewell to \$2 in Kiowa, \$1.75 in Morton, and \$1.50 in Decatur, Doniphan, Leavenworth and Shawnee counties.

Responses from 85 counties, having all the wheat raised except 181,514 bushels, received within the last days of September, 1894, to inquiries sent to 500 correspondents, asking their estimates on the percentage of the wheat crop of the year likely to be fed to farm animals, represented it as 30.4 per cent. of the wheat in those counties; a total of 8,524,983 bushels, or 110 per cent. (4,465,660 bushels), more than the entire crop of 1893 so used.

A SUMMARY OF CONCLUSIONS.

In a general way these reports show:

In Kansas, under the conditions as to product and prices of wheat and corn existing in the years 1893-'94-'95, wheat became a very unusual and very important factor in the grain-feeding of all classes of farm stock.

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It is superior to corn, pound for pound, as a grain to produce healthful, well-balanced growth in young animals.

Mixed with corn, oats, or bran, it is much superior to either alone, for work-horses.

Fed to cows, it is an exceptional milk-producer, and for that purpose corn is scarcely to be compared with it.

For swine of all ages, it is a healthful and agreeable food, giving generous returns in both framework and flesh, but fed whole, especially without soaking, is used at a disadvantage. Ground and made into slops, it is invaluable for suckling sows, and for pigs both before and after weaning. Yet, while the testimony is so favorable to wheat as a food for swine during their growing period, the consensus of opinion among shippers, dealers and packers at this time, so far as ascertained, is that, in finishing for the market, corn, or a considerable percentage of corn, yields flesh of a texture and quality superior to that made from wheat alone.

For cattle, it has, at least as a part of their grain ration, a very high value which is much enhanced in the line of needed variety by mixing with corn, and in a still greater degree by mixing judiciously with bran, oil meal or other albuminous foods tending to balance the too carbonaceous nature of the clear wheat.

With corn and wheat approximating the same price per bushel, it is not unprofitable or wicked to feed the wheat; yet, if it can be ground, rolled, crushed or in some way broken at a total cost not exceeding 5 to 7 cents per bushel, to feed it whole and dry is unwise.

It can be ground at a cost of 5 cents per bushel, and on a majority of Kansas farms for very much less.

If grinding is impracticable, soaking from 24 to 36 hours (the length of time depending somewhat upon the weather and season) is for various reasons deemed desirable, but is injudicious to any extent that its being moist facilitates swallowing without mastication or the proper mixing with saliva. Any arrangement or system of feeding by which the grain could be delivered in such a way that the animal could eat but slowly, would largely overcome this defect. No means has been suggested better than scattering on the bottom of a clean trough, a floor, or on the ground.

It is a superior feed for all fowls, and, as a promoter of the maximum egg-production, is unsurpassed by any other grain.

RESULTS FROM WHEAT-FEEDING AT THE EXPERIMENT STATIONS.

TWO OREGON EXPERIMENTS.

In September, 1891, Prof. H. T. French, agriculturist to the Oregon state experiment station, at Corvallis, undertook a pig-feeding experiment in which wheat figured prominently as one of the food stuffs. Previous to the beginning of the experiment, questions bearing on the subject of pig feeding were submitted to 75 leading farmers. From the replies to these questions, it appears that wheat has been employed in Oregon as a fattening food for swine for many years, and that it is now more commonly fed than any other grain.

The experiment was conducted with six fine and uniform Berkshire pigs, purchased, and weaned by an accident to the sow at four weeks of age, and kept in a thrifty, growing condition by liberal rations of kitchen slops and shorts, but no green food. For the purposes of the experiment, the pigs were divided into three lots of two each, consisting of a sow and barrow.



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The first lot was fed chopped oats for two months; then ground wheat for two months. The pigs were weighed every two weeks to determine the gain made. The two pigs weighed, at the beginning of the experiment, 302 pounds. During the first two weeks, on chopped oats, they gained 11 pounds; during the second two weeks, 36 pounds; during the third two weeks, 27 pounds; and during the fourth two weeks, 34 pounds.

At this point the feed was changed to ground wheat, and a marked acceleration in the rate of gain resulted. During the first two weeks on the ground wheat ration, the two pigs gained 67½ pounds; during the second two weeks, 69 pounds; during the third two weeks, 66½ pounds; and during the fourth two weeks, 19½ pounds.

The total gain for 60 days on chopped oats was 108 pounds, or nine-tenths of a pound a day for each pig. The total gain for 60 days on ground wheat was 222½ pounds, or almost two pounds a day for each pig. Of oats, the pigs consumed 585½ pounds, and of wheat, 1,017 pounds. Of oats, it took 5.4 pounds to make a pound of gain, and of wheat, it took a trifle less than 4.6 pounds.

A second lot of two pigs was fed on whole oats for 60 days, and then on whole wheat for 60 days. In the case of this lot, the difference in favor of wheat over oats was much less marked; indeed, from the standpoint of the relation of food to gain, it had disappeared altogether. The pigs weighed, at the beginning, 316 pounds. During the 60 days that they were fed on whole oats, they gained 129 pounds, or a trifle more than a pound a day for each pig. During the 60 days after the feed was changed to whole wheat, they gained 179 pounds, or 1½ pounds a day for each pig. Of oats, they consumed 732 pounds, and of wheat, 1,087½ pounds making the quantity of oats necessary to a pound of gain nearly 5.7 pounds, and of wheat, nearly 6.1 pounds.

The results obtained with the third lot of two pigs, which were fed on a mixture of chopped oats, wheat, barley, and shorts, are interesting in this connection only as showing much greater gains from the mixture than from either chopped or whole oats, and much smaller gains than from either whole or ground wheat.

A cross comparison between the results obtained from whole wheat and from ground wheat is interesting. The first lot of pigs weighed 410 pounds when the feed was changed from chopped oats to ground wheat. During the next 60 days they gained 222½ pounds. The second lot weighed 445 pounds when the ration was changed from whole oats to whole wheat, and during the next 60 days made a gain of 179 pounds. The 222½ pounds of gain on ground wheat was made at a cost of 1,017 pounds of food, or at the rate of 4.6 pounds of food to a pound of gain. The 179 pounds of gain on whole wheat was made at a cost of 1,087½ pounds, or at the rate of 6.1 pounds of food to a pound of gain. The meat of the pigs which were fed whole grain showed a somewhat greater percentage of fat than that of the mixed-ration carcass shown, but not so great a percentage as the meat of the chopped-grain carcasses.

It is difficult to make any definite statement of fact in regard to the quality of the meat produced by the different foods used, except that the mixed ration seemed to produce the best "marbling," with somewhat the greatest proportion of lean.

Another experiment in feeding wheat to hogs was conducted by Professor French at the same station in 1892. In this experiment, pigs weighing 300 pounds each made considerably better gains on ground wheat than on a mixture of chopped oats, wheat, and shorts, two pigs in four weeks gaining 147 pounds on the wheat ration, and two others of similar weight and equal thrift gaining but 124½ pounds during the same period on the mixture. During these four weeks it took 4.44 pounds of wheat to make a pound of gain, while it took 5.25 pounds of the mixture.

As the pigs grew heavier the showing in favor of clear wheat was more marked.

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During the second four weeks' period the two pigs fed on wheat made a gain of 139 pounds, and the two on the mixture but 94½ pounds. The wheat-fed lot required 4.94 pounds of food for each pound of gain, and those fed on the mixture required 6.35 pounds. The results of the third four weeks' period were 114 pounds of gain for the wheat-fed lot and 59½ pounds for the mixed-ration lot, the former requiring 5.97 pounds of food for each pound of gain, and the latter 9.03 pounds.

At the beginning of the trial as between wheat and the mixture, the two pigs to be fed wheat weighed, together, 544 pounds, and the lot to be fed the mixed ration weighed 592½ pounds. At the conclusion of the experiment, 12 weeks later, the wheat-fed lot weighed 941½ pounds, and the mixture-fed lot weighed 871 pounds. The wheat-fed lot gained 397½ pounds, at a cost of 2,022 pounds of wheat. As the wheat was valued at 45 cents a bushel, the cost of each pound of gain was a very small fraction less than 4 cents.

It is worthy of note that, in butchering, the shrinkage of the mixed-ration lot was 15 per cent. of the live weight, and of the wheat-fed lot only 13 per cent.

A SOUTH DAKOTA EXPERIMENT.

In September, 1893, Prof. E. C. Chilcott undertook by means of experiments, at the South Dakota experiment station, at Brookings, to discover something as to the profitableness of wheat as a food for swine. Bulletin No. 38 of the station embodies an elaborate statement of the results obtained.

For the purpose of experiment, eight pigs, averaging about 90 pounds in weight, were divided into four lots of two each.

Lot 1 was fed entirely upon Canada field peas, unground.

Lot 2 was fed upon spring wheat of rather poor quality, unground.

Lot 3 was fed upon Dakota-grown dent corn, ground.

Lot 4 was fed upon spring wheat, same quality as that fed to lot 2, ground.

The pigs were given all the food they could be induced to eat. Each lot was weighed once a week.

The feeding term covered 90 days, and was divided into three unequal periods — the first of 25, the second of 28 and the third of 37 days.

The following tables present concisely some of the results of the experiment. It is to be kept in mind that the figures in each case apply to a "lot" of two pigs.

Lot 1—Peas.

PIGS WEIGHED AT BEGINNING, 164 POUNDS.	First period.	Second period.	Third period.	Entire term.
Gain made, pounds.....	60	86	72	218
Gain per day, pounds.....	2.40	3.07	1.95	2.42
Feed consumed, pounds.....	202	268	433	913
Pounds feed per pound gain.....	3.37	3.29	6.01	4.21
Gain per bushel of feed, pounds.....	17.90	18.23	9.98	14.25

Lot 2—Unground Wheat.

PIGS WEIGHED AT BEGINNING, 174 POUNDS.	First period.	Second period.	Third period.	Entire term.
Gain made, pounds.....	52	78	73	203
Gain per day, pounds.....	2.08	2.78	1.97	2.25
Feed consumed, pounds.....	255	349	393	995
Pounds feed per pound gain.....	4.90	4.47	5.39	4.91
Gain per bushel of feed, pounds.....	12.24	13.42	11.13	12.22



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Lot 3—Corn Meal.

PIGS WEIGHED AT BEGINNING, 191 POUNDS.	First period.	Second period.	Third period.	Entire term.
Gain made, pounds.....	65	88	100	253
Gain per day, pounds.....	2.69	3.14	2.70	2.81
Feed consumed, pounds.....	291	385	483	1,159
Pounds feed per pound gained.....	4.47	4.37	4.83	4.58
Gain per bushel of feed, pounds.....	12.53	12.81	11.59	12.22

Lot 4—Ground Wheat.

PIGS WEIGHED AT BEGINNING, 205 POUNDS.	First period.	Second period.	Third period.	Entire term.
Gain made, pounds.....	58	87	93	238
Gain per day, pounds.....	2.32	3.10	2.51	2.64
Feed consumed, pounds.....	288	366	490	1,144
Pounds feed per pound gain.....	4.96	4.20	5.26	4.81
Gain per bushel of feed, pounds.....	12.09	14.28	11.40	12.49

Summary for Entire Term.

LOTS AND KINDS OF FEED.	Total gain, pounds.	Gain per day, pounds.	Feed consumed, pounds.	Pounds feed per pound gain.	Gain per bushel of feed.
Lot 1, peas.....	218	2.42	918	4.21	14.25
Lot 2, unground wheat.....	203	2.25	995	4.91	12.22
Lot 3, corn.....	253	2.81	1,159	4.58	12.22
Lot 4, ground wheat.....	238	2.64	1,144	4.81	12.49

During the first period, 1 pound of corn meal was equal to 1.10 pounds of unground wheat, or 1.11 pounds of ground wheat.

During the second period, 1 pound of corn meal was equal to 1.02 pounds of unground wheat, or .97 pound of ground wheat.

During the third period, 1 pound of corn meal was equal to 1.11 pounds of unground wheat, or 1.09 pounds of ground wheat.

The financial statement, as given in the bulletin under review, is interesting. It is as here:

STATEMENT.	Lot 1. Peas.	Lot 2. Unground wheat.	Lot 3. Ground corn.	Lot 4. Ground wheat.
Total dressed weight, Dec. 6.....	316	313	382	370
Received for dressed pork, at 51c. per pound.....	\$17 38	\$17 11	\$21 01	\$20 35
Cost of hogs, Sept. 5, at 41c. per pound, live weight.....	7 38	7 83	8 59	9 22
Balance to pay for feed.....	10 00	9 28	12 42	11 13
Feed consumed, bushels.....	15.30	16.62	20.71	19.06
Price per bushel realized.....	\$0 65.36	\$0 55.83	\$0 60.00	\$0 58.39

The questions which it was sought to answer through the experiment were as follows:

1. Can the farmers of this state realize more from their wheat by feeding it to hogs than by selling it, at present prices of wheat and hogs?
2. Can wheat be profitably fed without some other food to form a balanced ration?
3. Will it pay to grind wheat as food for hogs?

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4. How does wheat compare with corn and peas (Canada field peas) as food for hogs?

5. How does the quality of pork made from wheat compare with that made from corn, peas, and mixed food?

6. How does the average gain of hogs fed on an exclusive diet of wheat, corn or peas compare with that of hogs fed on mixed food?

7. When should fattening begin, and how long should it continue?

Professor Chilcott thus summarizes the answers which he believes he obtained:

"1. Hogs averaging about 100 pounds in weight can be purchased near September 1 at \$4.50 per cwt., live weight, fed three months on nothing but wheat, water, ashes, and salt, and an occasional handful of hay or corn fodder, butchered and sold December 1 for \$5.50 per cwt., dressed, and will return from 56 to 58 cents per bushel for wheat consumed, without allowing anything for manure or labor in caring for hogs.

"2. At present prices, wheat can be profitably fed as an entire ration, but it would undoubtedly *pay better* to mix it with some other food, particularly during the early stages of fattening.

"3. Hogs fed on ground wheat made a more rapid and uniform gain, and produced pork of rather better quality; but they also consumed more food than those fed upon whole wheat. Those fed ground wheat required 4.81 pounds of wheat to produce one pound of gain, while those fed whole wheat required 4.91 pounds to make the same gain. Ground wheat brought 58.39 cents per bushel, while that fed whole brought 55.83 cents per bushel, a difference of only 2.56 cents per bushel. This would hardly pay for grinding, but considering the better quality of the pork and greater weight, it would probably pay to grind, if it could be done without much extra cost.

"4. Ground wheat brought 58.39 cents, whole wheat 55.83 cents, peas 65.36 cents, and corn 60 cents per bushel, on an average, for all the grain consumed during the entire experiment, continuing for 90 days. Hogs fed on peas did much better, in proportion, during the first part of the experiment than they did during the latter part, which would indicate that peas are not as good for a complete ration for a long period as either wheat or corn.

"5. The quality of the pork made from corn and ground wheat was about equal, and was superior to that made from whole wheat, peas, or mixed food. That made from mixed food was the fattest [see cuts].

"6. The average daily gain of hogs fed on peas was 1.21 pounds; on whole wheat, 1.12 pounds; on ground corn, 1.40 pounds; on ground wheat, 1.32 pounds; and on mixed foods, 1.61 pounds.

"7. This question was not settled; but it was very plainly demonstrated that a considerably larger return per bushel for food consumed would have been realized if the hogs had been sold at the end of the second period. This was particularly true of lot 1, fed on peas. The decrease in rate of gain in proportion to food consumption for those fed corn meal and wheat was no greater than could be accounted for by the natural result of increased weight and age.

"Better results would undoubtedly have been obtained if the change from mixed food and plenty of exercise to close confinement and a single article of food, to which they were not accustomed, had been made gradually; as the number of pounds of food required to a pound of gain was greater during the first period than during the second, whereas, it should have been less."

Plates I, II, III and IV represents cross sections of the carcasses of the pigs in this experiment. The sections were made just back of the kidneys. Only the hind



half of each carcass is shown. There was considerable difference in the proportion of lean and fat meat in the different lots. Lot 3 (plate III), fed on corn meal, showed much less lean meat in proportion to the fat than did the other lots. In lots 1, 2, and 4 (plates I, II, and IV), the proportion of lean to fat meat did not vary more among the several lots than it did between different individuals of the same lot.

AN OHIO EXPERIMENT.

That 50 cent wheat may be profitably fed to 5 cent hogs has been abundantly demonstrated. It has also been demonstrated that 50 cent corn may be profitably fed to 5 cent hogs. The real question is, which is the more profitable at ruling prices? Shall a farmer sell corn to buy wheat, or sell wheat to buy corn, to feed to hogs? Or, having both, which shall he feed and which shall he sell or hold for future sale? An experiment was recently made at Ohio state university for the purpose of beginning the solving of these questions, and the corn fed whole and dry was almost completely masticated. No kernels passed through the hog whole, and only occasionally were pieces of corn recognizable in the dung. In the case of the wheat, however, fed in the same manner, much of it was not properly masticated, as many whole grains were to be found. Nine high-grade Poland-China hogs—six barrows and three sows—whose average weight was 135 pounds, were fed, during a preliminary week, on corn and wheat, half and half by weight. They were divided into three lots, with two barrows and one sow in each lot, due regard being given to weight and apparent feeding quality. One lot was then fed corn, another wheat, and the other wheat and corn, half and half by weight. In addition, each lot was given water, coal ashes, sulphur, and salt, but no other food whatever.

The hogs were weighed two days before the beginning, two days after the beginning, and upon the day the experiment began. The average of these three weighings is taken as the initial weight. The final weights were obtained in the same way. The experiment continued during 10 weeks. A summary of the results is given in the following table:

TABLE SHOWING FOOD VALUE OF WHEAT AND CORN.	Lot A.	Lot B.	Lot C.
	Wheat.	Wheat and corn.	Corn.
Average weight February 8, 10, and 12..... lbs.	411.00	401.00	407.00
Average weight April 19, 21, and 23..... "	702.00	693.00	678.00
Gain during 10 weeks..... "	291.00	292.00	271.00
Gain daily per pig..... "	1.39	1.39	1.29
Total food eaten during 10 weeks..... "	1,273.00	1,240.00	1,228.00
Food eaten daily per pig..... "	6.02	5.90	5.85
Amount of food to make 100 pounds increase..... "	438.00	425.00	453.00
Increase from one bushel..... "	13.70	12.30
Value of bushel, at \$5.15 cwt..... cts.	70.50	63.30
Cost of food for 100 pounds of increase (corn 35c., wheat 55c.).....	\$4.01	\$2.85

The best results for the number of pounds eaten were obtained where corn and wheat were fed half and half by weight. The next best result was obtained from feeding wheat alone, while, where corn was fed alone, the least increase was made for the number of pounds eaten. The differences in all cases were slight, in no instance being greater than might be reasonably expected with three lots of carefully selected hogs fed on exactly the same kind of food.

It took 438 pounds of wheat to make 100 pounds of increase, and 453 pounds of corn to produce the same gain in weight. A bushel of wheat made 13.7 pounds of pork, while a bushel of corn made 12.3 pounds. This is in part due to the different feeding values of the wheat and corn, and part to the fact that there are 60 pounds of wheat in a bushel, and only 56 pounds in a bushel of corn. The hogs sold for

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\$5.15 per 100 pounds. Putting aside the question of labor, a bushel of wheat brought 70.5 cents, and a bushel of corn 63.3 cents. With wheat at 55 cents per bushel, the cost of food for 100 pounds of increase was \$4.01, while with corn at 35 cents per bushel, the cost of the food for 100 pounds of increase was \$2.85. According to this experiment, it would have been a profitable procedure to trade wheat for corn at the ruling prices, for the purpose of fattening hogs.

A UTAH EXPERIMENT.

December 4, 1893, the Utah experiment station, at Logan, begun an experiment with 12 pure-bred, thrifty Berkshire boars, from 11 to 19 weeks old, divided into four practically even sets of three each, to test the profit and relative values of wheat, peas, corn, and barley, when mixed with one-half their weight of wheat bran. The grain was ground, each mixed with the bran, and made into slop with clear water at the time of feeding, and given twice a day, all the pigs would eat clean. Access was given also to a mixture of salt and wood ashes. At the beginning the sets weighed as follows:

Set 1, fed wheat and bran.....	106 pounds.
Set 2, fed peas and bran.....	111 "
Set 3, fed corn and bran.....	112 "
Set 4, fed barley and bran.....	112 "

May 16, after 5½ months' or 161 days' feeding, they weighed like this:

Set 1.....	439 pounds.
Set 2.....	639 "
Set 3.....	415 "
Set 4.....	381 "

This shows the set fed on the pea mixture as 200 pounds heavier than those of the wheat mixture, and 224 and 258 pounds, respectively, heavier than those fed on the corn and barley mixtures.

The average gain per week per set and total gain were:

Set 1.....	14.47 pounds.....	Average gain per day per pig,	.69 pounds.
Set 2.....	22.95 "	" " " "	1.09 "
Set 3.....	13.17 "	" " " "	.63 "
Set 4.....	11.69 "	" " " "	.56 "

Total gain per set, December 6 to May 16:

Set 1.....	333 pounds.
Set 2.....	528 "
Set 3.....	303 "
Set 4.....	269 "

The prices estimated as the cost of the foods used—and actually paid, except for corn—were these:

Wheat, ground.....	\$0 75 per cwt.
Peas, ".....	1 25 "
Corn, ".....	75 "
Barley, ".....	80 "
Bran.....	50 "

The following table gives some of the interesting figures covering the entire feeding period of 161 days:

Average gain per pig per day.....	lbs.	.69	1.09	.63	.56
Food eaten: Wheat, peas, corn, and barley.....	"	672.22	959.71	689.34	621.85
Bran.....	"	672.22	959.71	689.34	621.85
Total.....	"	1,344.44	1,919.42	1,378.68	1,243.70
Amount of food for 1 pound of gain, live weight.....	"	4.02	3.63	4.55	4.62
Cost of grain for 1 pound of pork, live weight.....	cts.	2.51	3.18	2.84	3.00

As a rule, in this instance, as in nearly every other, the quantity of food required to produce a pound of gain increased as the period of maturity advanced. Much



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more of the pea mixture was eaten than of any other, causing a more rapid gain and requiring less to make the gain.

The following table indicates the cost of the grain for a pound of gain, live weight, at their different stages of growth:

AVERAGE WEIGHT.	SET 1. Fed wheat and bran.	SET 2. Fed peas and bran.	SET 3. Fed corn and bran.	SET 4. Fed barley and bran.
35 to 50 pounds.....cts.	2.35	2.54	2.56	2.72
50 " 100 "....."	2.45	2.65	2.76	2.85
100 " 150 "....."	2.70	2.89	3.21	3.44
150 " 200 "....."		3.49		
35 " 150 "....."	2.49	2.70	2.91	3.00

Some of the foregoing averages are brought together in convenient form in a total, like this:

FROM DECEMBER 6 TO MAY 16.	Average of sets.	SET 1. Fed wheat and bran.	SET 2. Fed peas and bran.	SET 3. Fed corn and bran.	SET 4. Fed barley and bran.
Gain per day, per pig.....lbs.	.74	.69	1.09	.63	.56
Food consumed per day, per pig....."	3.04	2.78	3.97	2.85	2.57
Food consumed for 1 lb. of gain, live wt....."	4.20	4.02	3.63	4.55	4.62
Cost of food for 1 lb. of gain, live wt.....cts.	2.88	2.51	3.18	2.84	3.00

Supt. A. A. Mills, who supervised the work, summarizes his observations from it as follows:

1. Peas mixed with bran, half and half by weight, proved to be far superior to either wheat, corn or barley mixed and fed in the same manner, both as to rapid gain and to the amount required for one pound of gain.
2. The wheat mixture comes second, with corn and barley following, in the order named.
3. The pea mixture gave a gain of nearly 200 pounds more than the wheat mixture, 225 pounds more than the corn mixture, and 259 pounds more than the barley mixture.
4. While the pigs averaged the same weight, it required .89 of a pound more of the wheat mixture, 1.41 pounds more of the corn mixture and 1.53 pounds more of the barley mixture to produce 1 pound of gain, live weight, than of the pea mixture.
5. Peas and wheat proved to be excellent feed, fed mixed with bran in the manner described.
6. Reckoning pork at 4 cents per pound, live weight, after deducting the cost of the bran at \$10 per ton, wheat fed in this experiment brought 89.4 cents per bushel, or \$1.49 per hundred weight; peas, \$1.70 per hundred weight; corn, \$1.26 per hundred weight; and barley, \$1.23 per hundred weight.
7. On the above basis, peas should be worth 13 per cent. more than wheat, while corn should be worth 15 per cent. less, and barley 17 per cent. less.

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REPORTS ON WHEAT-FEEDING IN KANSAS, BY COUNTIES.

ALLEN COUNTY.

J. W. Hamm, Humboldt.—The wheat fed to farm animals has mostly been soaked or ground—very little fed dry. Fed whole, fully 5 per cent. seems to pass the animals without mastication. Wheat seems as nourishing and healthful, or more so, than corn, especially for young hogs. It makes about 14 pounds of live pork per bushel, and, at the same price per bushel, it is about 10 per cent. more valuable for fattening hogs than shelled corn. All farmers in this region who have fed wheat to hogs report very satisfactory results, and that the meat is as good or better than that from corn. Equal parts of wheat and corn ground together is the best food for hogs—better than either fed alone. Work horses are being fed wheat, and they appear to do just as well as on corn; but one part of oats to three parts of wheat is best to maintain their strength and flesh. Ground wheat is a good milk ration. For horses it is 10 per cent. more valuable than corn, and for milch cows about 15 per cent. Wheat is worth 45 cents and corn 37 cents, at which it is more profitable to feed than to ship the wheat. It would not be profitable to exchange wheat at the mills for bran, as the millers are charging more for their bran than for other kinds of feed. It costs about 4 cents per bushel to get the wheat ground at the public mills, and it increases the value of the feed to that amount. Some farmers are using the "Pony" mills, with a capacity of 25 bushels per hour, which makes the grinding cost about 2 cents per bushel. Computing interest on land valued at \$40 per acre, the labor, and wear and tear of equipment, it costs about 77 cents per bushel to raise 10 bushels of wheat per acre; 15 bushels cost 53 cents; 20 bushels, 41 cents; 25 bushels cost 34 cents; 30 bushels, 29 cents, and 35 bushels cost 26 cents per bushel. For feeding pigs or brood sows, there is nothing equal to ground wheat mixed with milky slops. An acre of straw is worth 50 cents.

ATCHISON COUNTY.

Joshua Wheeler, Nortonville (Jefferson County).—The wheat raised in this county and fed to stock has been mostly ground for that purpose. It has been found to be of 10 per cent. less value for horse feed than corn. If wheat was 40 cents and corn 30, to sell the wheat and buy corn would be more profitable, but if this was not convenient, I would exchange the wheat for bran or shorts at the mills. I used a horse-power "American" grinder, at a cost of about 2 cents per bushel. On land worth \$40 to \$50 per acre, it costs, counting everything, \$1 per bushel to grow 10 bushels per acre; 15 bushels cost 70 cents; 20 bushels, 55 cents; 25 bushels, 50 cents; 30 bushels, 44 cents, and 35 bushels, 40 cents per bushel. The straw is valued at \$1 per acre. The greater part of wheat fed to stock has not been of marketable grade. My judgment is, that 56 pounds of shelled corn is worth more for horses and hogs than 60 pounds of wheat. The grinding of oats and wheat together and feeding to horses did not give as good satisfaction as corn and oats.

BARBER COUNTY.

Ed. H. Smith, Hazelton.—Wheat in this county fed to farm animals is mostly whole and soaked, in which form more than 50 per cent. of it passes the animals without mastication. It appears as nourishing as corn, but it is not so strong a



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food, and when fed to hogs it does not prove as fattening as shelled corn. The flesh of wheat-fed hogs is good and sweet, but not as solid as that from corn. Wheat is a good growing food for young hogs, but for fattening some corn is necessary—at least equal parts of corn and wheat. It is fed to work horses, but generally mixed, equal parts, with corn or oats, and fed about the same as other grains; but it does not seem to maintain the strength of the horses, and they cannot stand their work as when fed on corn or oats. My experience in feeding milch cows is, that too much wheat dries them up, and that bran is better and safer. With wheat at 40 cents and corn at 30 cents, it would be better to haul both ways and sell the wheat and buy corn. I think it would be a profitable scheme to exchange the wheat at the mills for bran, at current prices, as it is a better and safer feed than wheat. The public mills charge 5 cents per bushel for grinding, but I do not think the feed is increased in value enough to offset the expense. Counting interest on land worth about \$20 per acre and wear and tear of equipment, it costs about 48 cents per bushel to raise 10 bushels of wheat per acre; 15 bushels cost 34 cents; 20 bushels cost 29 cents; 25 bushels cost 25 cents; 30 bushels cost 22 cents; 35 bushels cost 20 cents. This is on the following basis:

Interest, 7 per cent. on \$20.....	\$1 40
Plowing 1 acre.....	1 00
Harrowing.....	10
Seed and drilling.....	1 00
Harvesting and sacking.....	1 00
Thrashing 10 bushels.....	70
Total cost, 10 bushels.....	\$5 20

BARTON COUNTY.

Jno. Armstrong, Great Bend.—It is generally ground, but when fed whole at least 20 per cent. passes the animals without mastication. It appears as healthful and nourishing as corn, especially for young animals and milch cows, and at the same price per bushel it is about 5 per cent. more valuable than corn for feeding hogs. The most satisfactory ration for hogs is equal parts of wheat and corn, ground. It is fed to work horses by mixing—half and half—wheat and corn, chopped, and seems to maintain their strength, and only requires about two-thirds as much in quantity as of corn. There is a large amount of wheat fed to dairy stock, with more satisfaction than corn. At the same price per bushel, wheat is 10 per cent. more valuable than corn for feeding horses, 15 per cent. more for milch cows, and 10 per cent. more for other cattle. Wheat is 36 cents and corn 33 cents; but if there was 10 cents difference in the prices it would not be a profitable transaction to haul both ways to sell the wheat and buy the corn. From the feeder's standpoint, it would not be profitable to exchange wheat at the mills for bran or shorts. The stuff given in return would, much of it, be from the poorest or damaged grain. It costs 6 cents per bushel to have the wheat ground at the public mills, and the increased value of the feed more than overbalances this expense. Steel mills are run by steam power on some farms, and can grind for about 4 cents per bushel. Computing interest at 7 per cent. on the value of the land, and the wear and tear of equipment, it costs about 64 cents per bushel to raise 10 bushels of wheat per acre; 15 bushels, 47 cents; 20 bushels, 38 cents; 25 bushels, 33 cents; 30 bushels, 29 cents; 35 bushels, 26 cents per bushel. Hogs running on alfalfa can be profitably fed ground wheat made into slop, even though the wheat cost 15 cents per bushel more than corn. But for finishing the hogs for market, they should have two weeks of full feeding on corn and water.

BROWN COUNTY.

E. Harrington, Baker.—Wheat is as nourishing and more healthful than corn, being a preventive of disease among the stock. Fed to hogs, it may be 10 per

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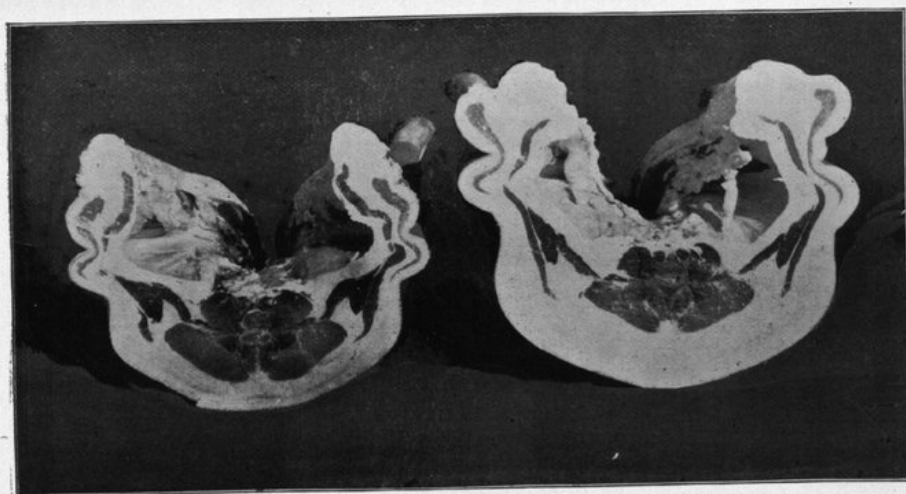


PLATE L—LOT 1. (See page 463.)
Hogs weighed an aggregate of 382 pounds. Fed on Unground Peas 90 days.