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HOG HOUSES.

BY

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY,
Washington, D. C., January 20, 1911.

SIR: I have the honor to transmit herewith and to recommend for publication as a Farmers' Bulletin a manuscript entitled "Hog Houses," by Mr. J. A. Warren, formerly of the Office of Farm Management, Bureau of Plant Industry.

The paper deals especially with a subject that is of great importance to hog raisers, namely, the sanitary and economical housing of the animals.

The question of location of windows to provide the maximum amount of sunshine in the pens at farrowing time is particularly well developed by Mr. Warren, and in this connection is given a sunshine table based on astronomical calculations, for which the author is indebted to Prof. Milton Updegraff, in charge of the Nautical Almanac of the United States Naval Observatory.

Respectfully,

A. D. MELVIN,
Chief of Bureau.

Hon. JAMES WILSON,
Secretary of Agriculture.

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HOG HOUSES.

INTRODUCTION.

In the corn belt hogs furnish one of the most important means of marketing the corn crop. With the exception of chickens, they are the most numerous of all farm animals, and are grown for market on more farms than any other stock. Hog raising has probably made more clear money for the corn-belt farmers than any other enterprise. In view of this one might expect to find hogs the best housed of any animals on the farm, but the opposite is the case. It is still hard for many farmers to get rid of the notion that anything is good enough for a hog. Yet there is no animal on the farm which requires better protection from cold than the hog; none for which a good bed is more necessary; and none so much in need of sunshine as the little pig. The horse and the cow have good coats of hair—even a calf or a colt when left in the cold is provided with a good fur coat; the hen's feathers are the best of protection against cold; but the hog has almost nothing between his skin and the weather.

One of the first requisites for success with hogs is a shelter where young pigs can be kept warm and well supplied with sunshine and fresh air. A little pig takes cold very easily and recovers slowly if at all. To prevent taking cold he must be kept dry, warm, away from drafts, and provided with fresh air.

Most good hog raisers who have warm buildings try to have their sows commence farrowing about March 1, but without good houses this is impracticable. Breeders find it necessary to have their pigs come about this time in order to have them large enough for the fall demand, and producers of market hogs find the practice profitable. Early pigs have several marked advantages. In the first place, there is usually more time to care for them early in March. Early March pigs are large enough to begin to eat as soon as pasture is ready and thus get the longest possible pasture season, and can be expected to make more pork from grass than is possible for later pigs. They can be kept on pasture until ready for market, or nearly so. Not only can they make more use of pasture but they can make more economical use of all feed because they can be finished for market before the cold weather of winter sets in, when gains are more ex-

pensive. If these pigs are crowded, many of them can be marketed by the last of October, and for the last 10 years the Omaha price for October has averaged 58 cents higher than for December. Without a good house two litters a year can not be raised to advantage, because the spring pigs must be put off until so late that the fall litters do not get well started before cold weather, but with a good house two litters can well be raised. Most farmers do not feel that they can keep an old sow for one litter, but with two litters it becomes a different proposition. It is universally conceded that old sows raise better pigs than young ones, and the keeping of old sows enables one to select and keep only the best producers.

PREVAILING CONDITIONS POOR.

On the average, the hog house is the poorest building on the farm and the least adapted to the purpose for which it was intended. Good barns may be seen on a large proportion of the farms, but good hog houses are generally hard to find. It is economy to put up first the buildings that will help most to make money. A large portion of the farmers recognize this and build a good barn before putting up a good house, saying "The barn will help build the house but the house will never help build the barn." This principle seems to be lost sight of when it comes to the hog house, yet no other building on the farm pays for itself so quickly. Unpublished data collected by the writer show that good hog men average about seven pigs raised to the litter and many surpass this record. The same data indicate that the general average raised on the farm does not exceed four pigs to the litter. This wide difference is very largely due to the housing.

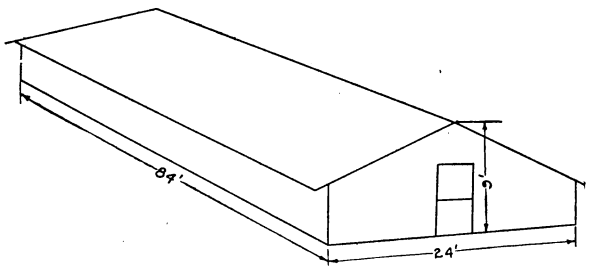


FIG. 1.—A poor hog house; no provision for light or ventilation.

Many houses which cost enough to be good are thoroughly unfit for the purpose because the sun can not shine into the pens. Nearly every large hog house is deficient in either sunshine or ventilation, or in both.

The diagram, figure 1, represents a farrowing house seen on one of the most highly improved farms in southern Nebraska. To replace the buildings on this farm would cost $12,000 or $14,000. The hog house is the nearest building to the house, and stands almost between it and a large, modern horse barn. This hog shed is 24 feet wide

and 84 feet long. There is not a window or ventilator in it, the only means of admitting air and light being the alley doors and a few small hog doors. A more unsuitable structure could hardly be devised.

The writer has personal knowledge of another hog house quite similar to this but only about half as large, the only openings being one alley door, one hog door, and one small window. In this house over 90 per cent of the early pigs were lost in some seasons, mostly from thumps. The loss in a single season would have more than paid for a good building.

A little pig loves sunshine and needs it almost as much as he needs food. No piggery is fit for the purpose unless it admits direct sunshine onto the floor of every pen at the time the pigs are farrowed, furnishes plenty of fresh air, and provides for exercise in the open air. Dryness, sunshine, warmth, fresh air, freedom from drafts, and exercise are of primary importance in raising pigs. These secured, the battle is half won. In putting up buildings the six requirements just mentioned must be kept constantly in mind; not one can be neglected.

COST OF HOUSING PIGS.

What is the necessary cost of housing a litter? Where lumber is $25 to $35 a thousand, good single-walled houses need not cost over $10 to $20 a pen, and double-walled $20 to $30 a pen. It is doubtful economy, under most conditions, to make them cost over $30 a pen, and very good sheds are sometimes made for less than $10 a pen. It is easy to get too much expense into any building, and the hog house is no exception. No one can afford for any purpose a building so expensive that interest and depreciation will eat up its usefulness. The owner of a new hog house once showed it to the writer with considerable pride. The building was equipped with conveniences of the best sort and appeared to be ideal in every respect except one—cost. It contained 18 pens besides the feed bins, and cost, according to the contractor, approximately $4,000, or $222 a pen. The interest on this investment at 5 per cent amounts to $11.10 for every sow pen, and the annual cost of each pen, including interest, depreciation, repairs, and insurance, would be about $27, which, as has been shown, is amply sufficient to pay for a good pen outright; or, at average Omaha prices ($5.50 per hundredweight), it would take two 250-pound hogs every year to pay for the maintenance of a single sow pen. It is hard to see how such a building can ever pay for itself.

By careful management it is not difficult to make each pen accommodate three litters a year. Taking $25 as the cost per pen (which

is sufficient to make a good double-walled building), we have the following:

Interest on investment ($25), at 5 per cent	$1.25
Insurance, at 50 cents per $1,000	.0125
Repairs, 1½ per cent	.375
Depreciation, 5 per cent	1.25
Total	2.8875

Using each pen for three litters a year, the cost of housing one litter would be slightly less than $1. This is about what one pig has cost when farrowed. Or, with the high prices that have prevailed for several years, one pig at weaning time would pay for the use of one good pen a whole year, which would accommodate three litters, averaging seven pigs or more each. Of course, more shed room is required for the older hogs, but this may be of much cheaper construction. If only one litter a year is raised, no other shed would be needed. Many farmers have provided usable structures for less than half the above figures.

VARIETIES OF HOG HOUSES.

The variety of hog houses is almost as great as the variety of individuals using them. It is rare, indeed, to find even a semblance of uniformity prevailing in a community. There are, however, only two or three general types which commend themselves to the careful hog man. Of the two styles of large houses, the larger has two rows of pens, an alley through the middle, and a jog in the roof for windows to light the north pens, while the smaller has but one row of pens, with an alley and a row of windows on the south side. The double house is much cheaper per pen, and for that reason is to be preferred. Less work is also required to care for the hogs than where a single row of pens is used.

Probably the cheapest house possible is a low building with a single row of pens and no alley (see figs. 13 and 14), but such a house is much less convenient, especially in stormy weather. In northeastern Kansas and southeastern Nebraska there are a number of houses with common gable roofs which are lighted by rows of glass extending from the ridge of the roof to the plate. This seems an awkward method of securing sunshine and has nothing particularly in its favor.

A large hog house should always stand east and west, facing the south, so that the maximum amount of sunshine may be had in each pen. When a double house is used, which is much the cheapest, the outside pens on the north are often of little use in early spring and late fall on account of the shade and the cold winds. This difficulty can be partially overcome by changing sows so that those which have

not farrowed and those with the oldest pigs, which have least need of warm outside pens, are on the north side. This problem has been ingeniously solved by a prominent Duroc breeder whose hog house is later described in detail. (See figs. 9 and 10.)

In the majority of large hog houses the upper windows are not so placed that the sunshine will strike the floor when it is most needed there. Indeed, a hog house with the windows in the proper position is rarely seen. Direct sunshine should strike the floor in every pen for as many hours in the day as possible at the time when the pigs are farrowed. Nearly every one realizes this is a matter of the greatest importance, but too often the builder does not take the trouble to find out whether he is getting it or not. Ordinarily the farmer has no means of ascertaining where to put the windows so as to get the maximum amount of sunshine at the time he wants it, unless he happens to be building just at that time, which is very unusual. The country is dotted with hog houses in which the owner thought he was putting the windows where he wanted them, but found later they were in the wrong place.

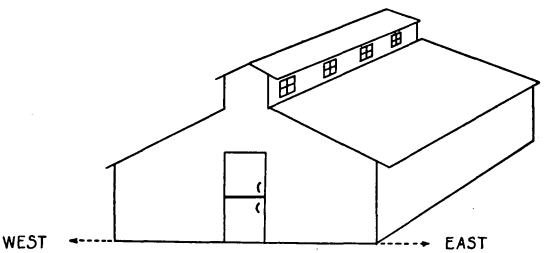


FIG. 2.—A common but unsatisfactory type of hog house; insufficient light, and stands north and south instead of east and west.

In double houses the windows for lighting the south pens must be as high up as possible in order to get them away from the hogs.

EXAMPLES OF FAULTY CONSTRUCTION.

Figure 2 is an outline of one of the commonest types of hog house in many communities, but utterly unfit for the purpose. This type of house almost always stands north and south. Very little sunshine ever strikes the floor, and as a consequence the pens are often damp and chilly.

The building shown in figure 3 is about 30 miles north of the fortieth parallel. It is well built and of the best material on the market. It is 22 feet wide, 42 feet long, contains fourteen 6 by 8 pens, and cost, approximately, $250, or $17.86 a pen. Figure 4 is a cross section of figure 3, showing where the sun's rays will strike at noon March 1. It will be seen that there can be no appreciable amount of sunshine on the floor of the north pens until about the middle of the month. In this case the common mistake was made of placing the windows too high above the floor and thus impairing the usefulness of the north pens. The walls should have been lower and the south roof flatter, so as to lower the upper windows.

The hog house shown in figure 5 is near the fortieth parallel. The north roof is shingled; the south roof has patent roofing. Inside

FIG. 3.—A substantial building, but with upper windows too high for locality where built unless late farrowing is desired.

pens are 7 by 12 feet. The back half of the pens is floored with plank, the front half and alley with concrete. This is a very good house, especially if one wants to feed inside. The upper windows, however, are too low for the width of the house. It is true the windows are in right position for farrowing on February 1, but if the pigs are wanted a month later, then, as the diagram (fig. 6) shows, the sunshine will be on the concrete floor a large part of the day March 1, and much more of the time later in the season. This will induce the pigs to lie on the concrete and cause them to take cold. Another set of windows higher up would correct the error, and should be put in.

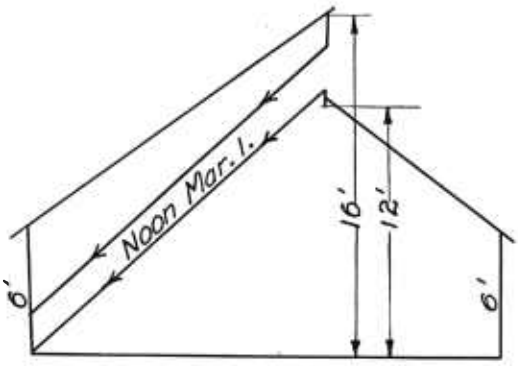


FIG. 4.—Cross section of house shown in figure 3, showing where sunshine from upper windows will fall at noon March 1.

TWO WELL-BUILT HOG HOUSES.

Figure 7 shows a hog house built in south-central Nebraska in 1909. The walls are unmatched sheathing, paper and lap siding. The roof is shingled. This house is 24 by 40 feet, and contains ten

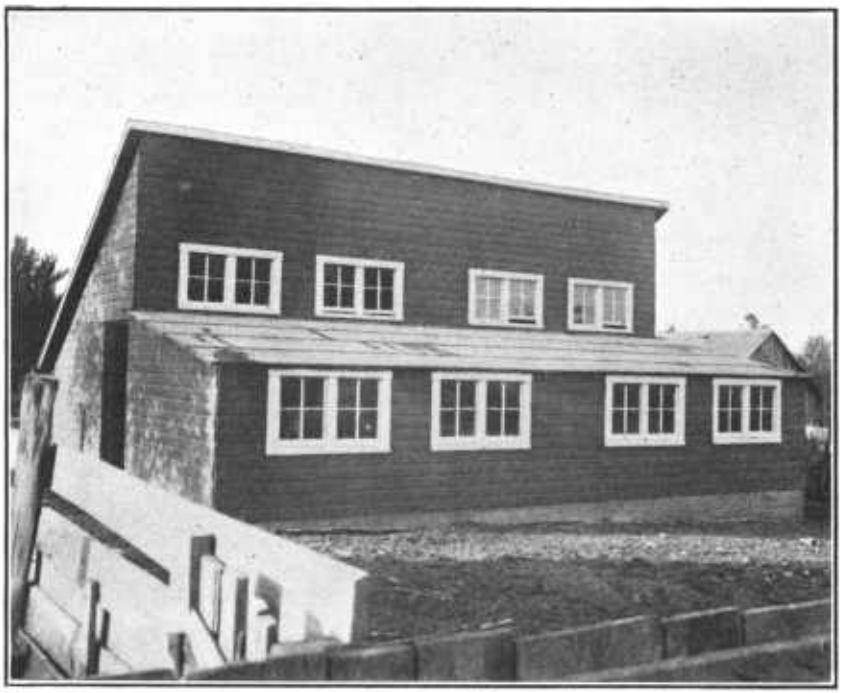


FIG. 5.—A building in which the upper windows are too low for farrowing March 1—an uncommon mistake.

8 by 10 pens. The cost of material was $260, labor $60, total $320, not including foundation, or $32 a pen. Including the foundation, the cost must have been at least $36 a pen. The middle window of each group of three swings on stops for ventilation. The inside fences are 33 inches high and are made of four 1 by 6 and two 2 by 4 pieces. One 2 by 4 is laid flat on top.

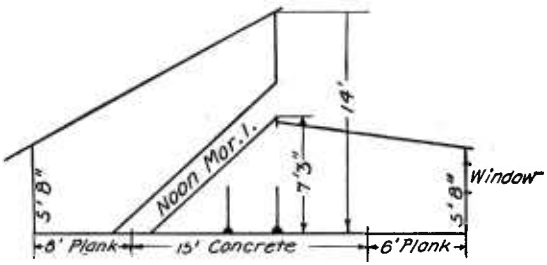


FIG. 6.—Cross section of house shown in figure 5, showing where sunshine from upper windows will fall at noon March 1.

Figure 8 is a cross section of the house shown in figure 7, showing where the sunshine will strike at 10 a. m. March 1. This shows that the sunshine from the full length of the window will strike the floor over four hours a day March 1.

This is a good hog house, but rather expensive. The pens could as well have been 6 feet wide instead of 8, and the cost per pen would

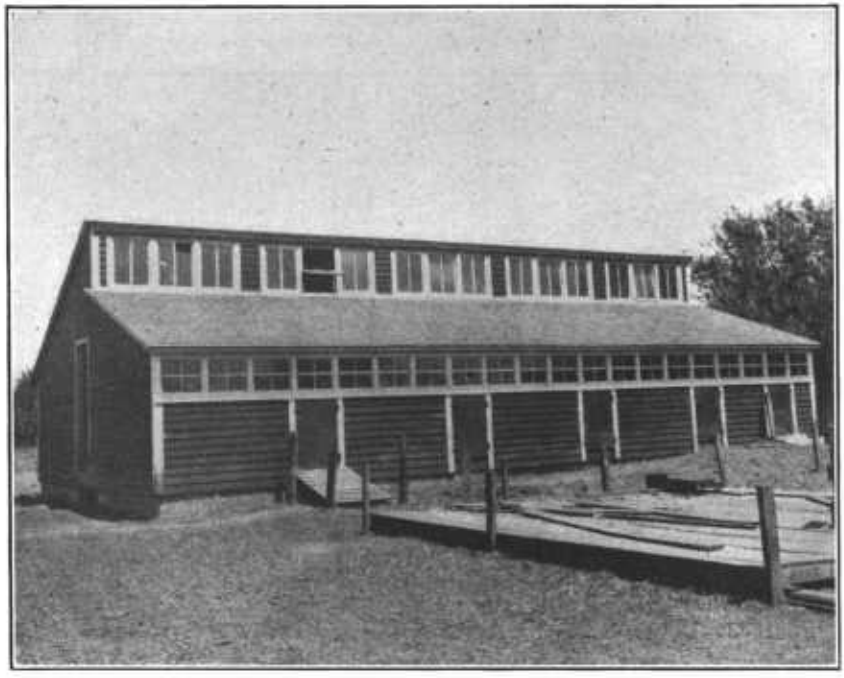


FIG. 7.—A hog house with upper windows perfectly arranged for farrowing March 1.

thus have been reduced almost one-fourth. The usefulness would be improved by the addition of outside pens. The owner is a hog man of long and successful experience. He has used both individual and two-hog cots for many years, but has now supplemented them with this large house.

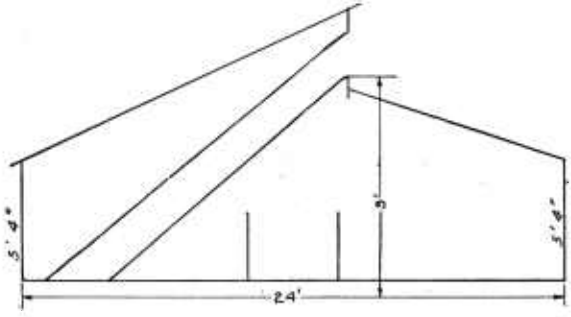


FIG. 8.—Cross section of house shown in figure 7, showing where sunshine from upper windows will fall at 10 a. m. and 2 p. m. March 1.

Figures 9 and 10 represent a house built by one of the most prominent Duroc breeders after careful study. It is a most serviceable structure and one of the best the writer has ever seen. It is one of the few hog houses that have proved so satisfactory that the owners are willing to duplicate them. This

house has been copied by a number of farmers in the vicinity, some of whom, however, have made the mistake of building a longer house and not making provision for outside pens for the extra inside pens.

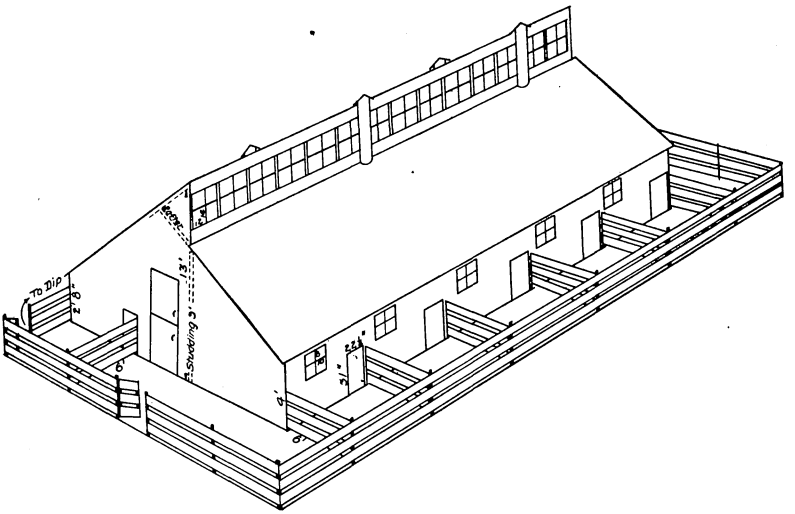


FIG. 9.—A well-built and well-arranged hog house, showing arrangement of outside pens.

The walls are sheathed, papered, and sided. The roof is shingled. The outside floors on the east, west, and south are 6 feet wide. This

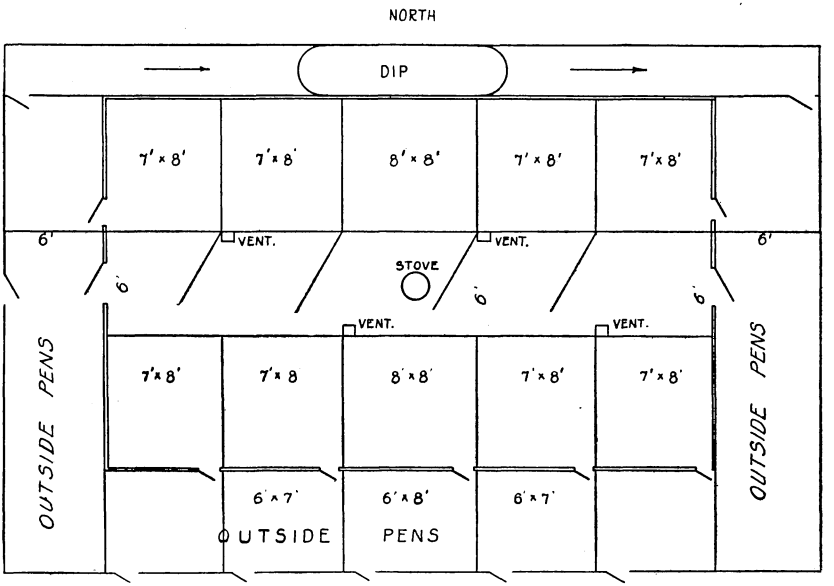


FIG. 10.—Ground plan of house shown in figure 9, showing arrangement of inside and outside pens, etc.

house is 22 by 36 feet and contains ten pens. It was built north of Omaha in 1905 and cost, complete, including labor, $275, or $27.50 a pen. This includes the outside floor and pens.

The gates across the alley all lift off their hinges so they can be removed or replaced in a moment. This arrangement makes it very convenient in sorting hogs to change them from one pen to another or to make extra pens when crowded. When swung across the alley the free ends of the gates fasten with common house-door bolts. By putting these on so the knobs turn up instead of down, the owner finds that hogs can not open them. If the knobs turned down the hogs could open them readily. The fronts of the pens next the alley are all loose panels which lift out. In this way the whole house can be made into one large room in a few minutes, nothing but the pen partitions being left in place.

The inside pens are 7 by 8 feet, except the middle one on each side, which is 8 by 8 feet. (The pens are irregular in width because the lumber cut this way to better advantage.) The hog doors are 22½ by 31 inches in the clear. The large doors are 3 by 6 feet, divided in the middle. The upper windows each contain four 12 by 14 inch lights and are set solid and close together. The lower windows each contain four 10 by 12 inch lights.

The most striking feature of this house is the ingenious way in which outside pens have been provided without having them on the north side. There is an outside pen for every inside pen except one, the sows on the north side going out as indicated by the arrows in figure 10. This could not be accomplished with any more pens.

The ventilators are 6 by 6 inches inside. The lower ends are 2 feet above the floor and the upper ends just above the comb of the roof. The south rafters are extended to meet the north rafters so that no studding are needed under the south edge of the north roof (see fig. 9). Whether this gives any advantage is doubtful. The sunshine will strike the floor in all pens several hours a day on March 1.

The dipping tank is convenient, but in a cold place. Perhaps this could be bettered.

A COMBINATION HOG HOUSE WITH HAY AND GRAIN STORAGE ROOMS.

It is a great convenience to have grain bins and storage room for bedding and hay in the hog house. In some houses similar to those described above such space has been provided by simply extending the building. A modification of the double house, which provides storage room and contains several other excellent features, is described below.

Figures 11 and 12 show the plans of a hog house built by a very successful grower of market hogs in western Iowa in 1906. It has now been in use four years and has given the owner excellent satisfaction. It contains 24 pens, each 5 by 9 feet, a covered feeding

floor, bins for grain, tankage, and oil meal, and mow room for hay and bedding. The material cost, approximately, $400. The labor was all performed by the regular farm help and no account of it was kept. In this house a large number of hogs can be cared for with a

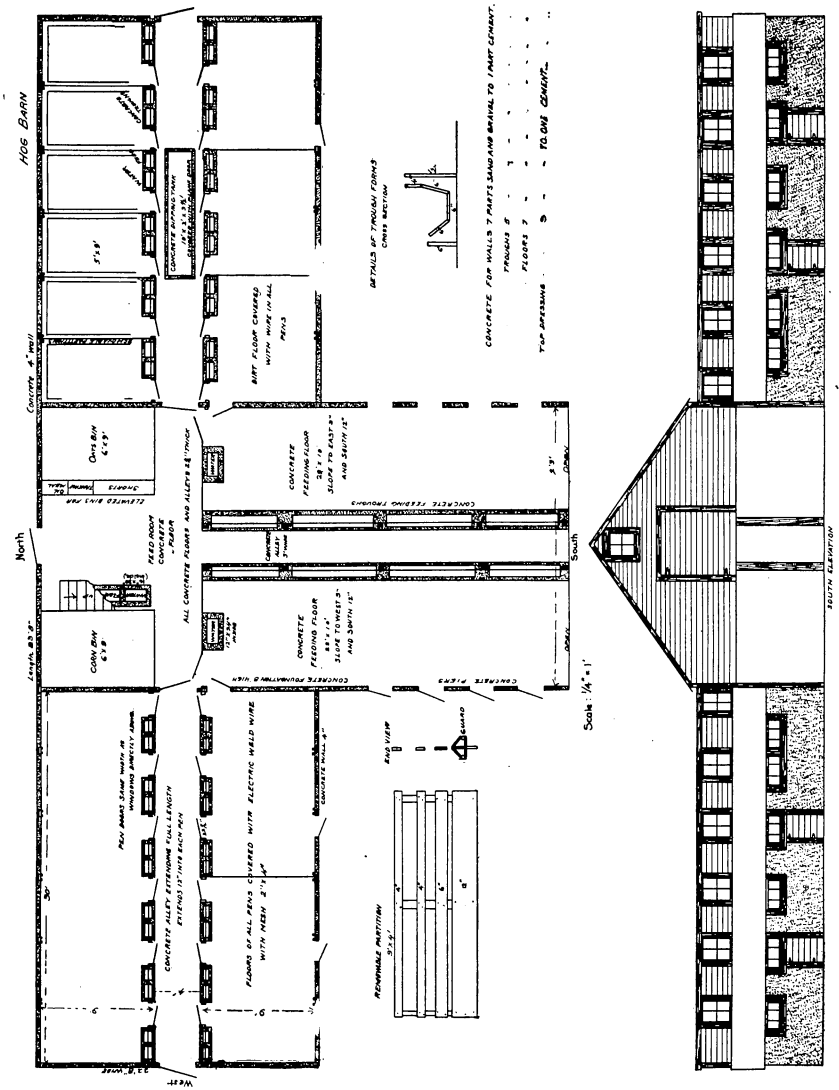


FIG. 11.—A combination hog house, with hay and grain storage rooms.

very small amount of work. The high roof of the central part shuts off a portion of the sunshine from the sow pens. This is a bad feature, but one which could not be avoided without sacrificing the feeding floor and the convenience of the interior arrangement. This shading of the sow pens seems to the writer a very grave error, but

the owner, after four years of experience, does not consider it very serious. Of course, even the pens next to the central part get the benefit of the sunshine somewhat more than half of the day. But it is evident that the windows nearest the central part of the building

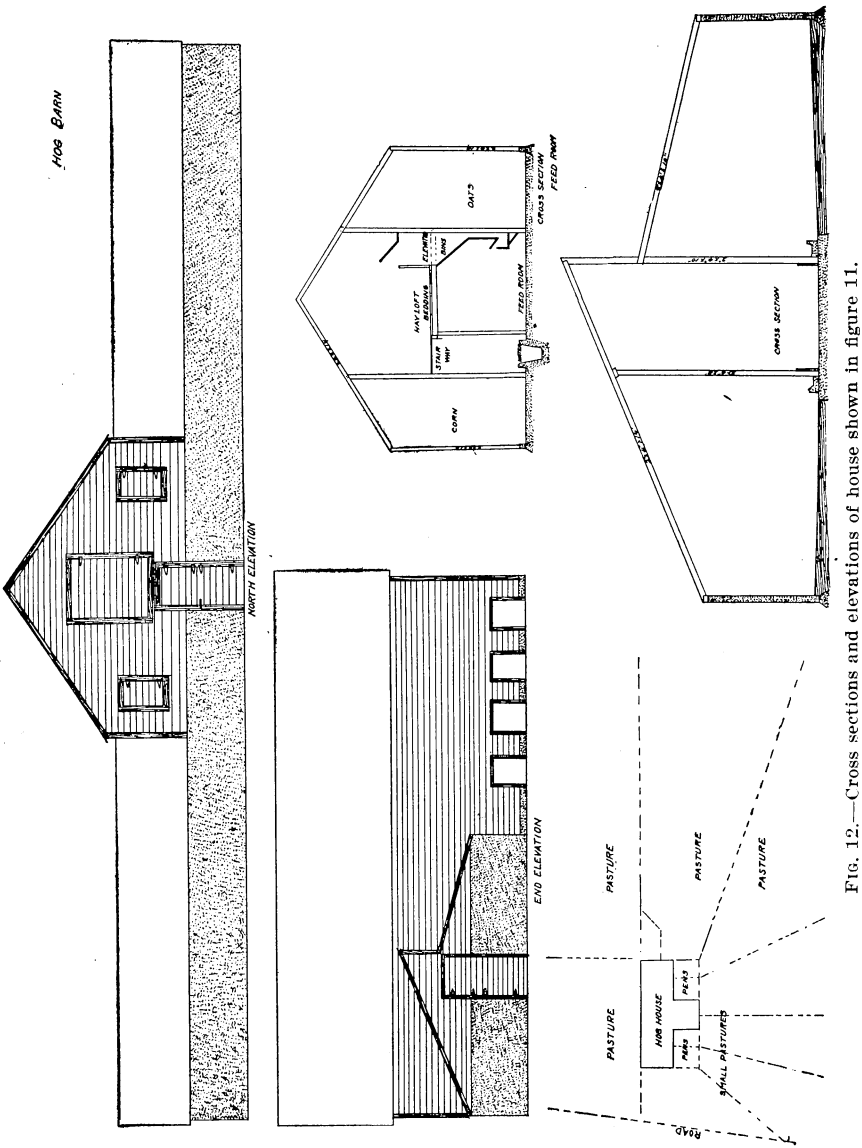


FIG. 12.—Cross sections and elevations of house shown in figure 11.

throw sunshine on the floor only a very short time. They would be much more useful if they were several feet from the high building. The owner now regrets that he did not make a solid row of windows both above and below.

Shed cots are used in connection with this house, the sows being moved out generally when the pigs are about two weeks old.

TWO TYPES OF CHEAP HOUSES.

Figure 13 shows a cheap house, but lacking in light and ventilation when the roof doors are closed. It is 6 by 48 feet and contains 8 pens, each 6 by 6 feet. The material (not including outside pens or posts) cost $48, or $6 a pen. Figure 14 shows the end elevation.

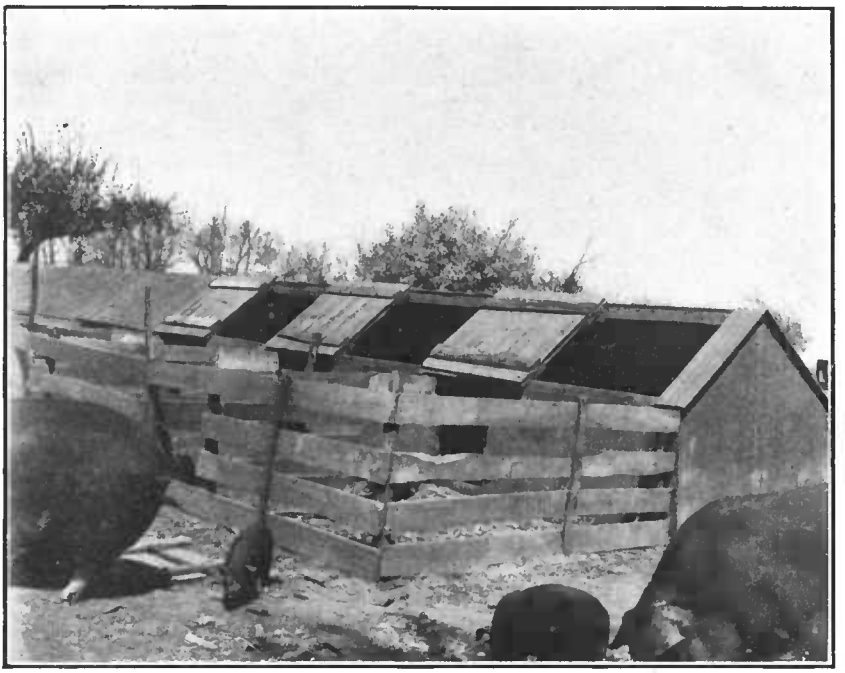


FIG. 13.—A very cheap hog house, but lacking light and ventilation when roof doors are closed.

Figure 15 shows a much better house of the same general type. It contains sixteen 5 by 7 pens. The material cost (in southeast Nebraska, 1907) is $115, or $7.19 a pen.

HOG COTS OR INDIVIDUAL HOUSES.

Whether the large house with individual pens is better than the individual cot is an open question, perhaps largely a matter of individual preference. Each has its distinct advantages which can not be secured in the other. Many of the best hog raisers are now providing themselves with both types of houses, and this seems to be the most satisfactory method. It is no more expensive in the long run, for all the buildings can be kept in use the year round. In such cases

the large houses are used for farrowing quarters, and as soon as the pigs are a week or two old, or as soon as the weather permits, the sows and litters are removed to the individual cots. During the remainder of the year the large houses are utilized for sleeping quarters.

The small cot has the advantage of keeping each sow from the disturbance of the others, and lessens the danger from contagious and infectious diseases. The disturbance in a large house, however, is usually not a serious matter and is often unduly emphasized. After the pigs get a little start there is usually more or less robbing where many are together. The individual cot lessens this trouble. When the surroundings become insanitary, the cot can easily be moved to a clean place.

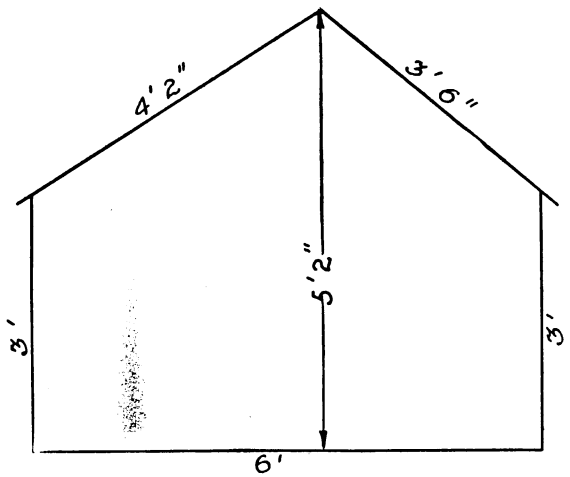


FIG. 14.—End elevation of house shown in figure 13.

Probably the greatest disadvantage in the cot is the large amount of work required to tend the stock. This is a matter of no small importance. There are usually no windows, so there is no sunshine or light when the roof door is closed. There is, however, no reason why windows and ventilation should not be provided. The open roof which is commonly used places the pigs in more danger of being chilled by cold winds and sudden storms when the attendant is away. Unless the cot is unusually well built, it is somewhat more difficult to keep warm in very cold weather than the large house.

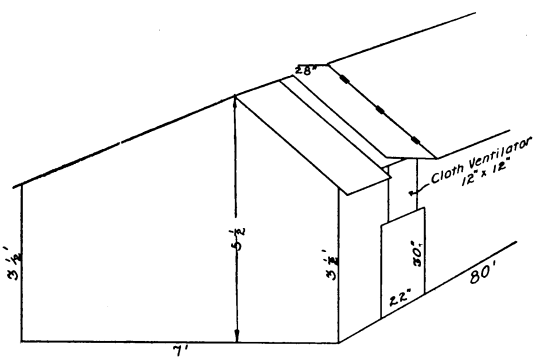


FIG. 15.—A cheap but serviceable house—an improvement on that shown in figures 13 and 14.

The main advantage in the large house lies in the convenience with which the stock can be tended and the short time required to see all the animals. It is somewhat more easy to keep warm, and is more

easily heated if artificial heat is required. During cold days the pigs can get the sunshine, if there is any, without any exposure whatever.

The variety of individual hog houses is greater, if anything, than that of large houses, but they are readily separable into two general classes—the Λ-shaped cot, and the various cots with perpendicular sides. The Λ-shaped cot is quite satisfactory when well built and provided with a window and ventilating door, but generally these are lacking. Nearly all of the cots with perpendicular sides have doors in the roof or in the south side to be opened in sunny weather. It is easier to care for sows in these houses than in the Λ-shaped cots. All cots should be built on skids. Some of the best types of cots are described below.

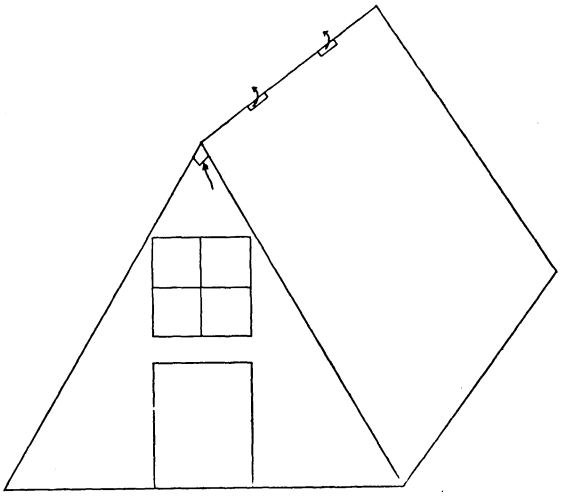


FIG. 16.—The Lovejoy individual hog house or cot.

Figure 16 represents one of the best styles of Λ-shaped cots, commonly known as the Lovejoy cot. In 1904 the Nebraska Hospital for the Insane, at Lincoln, built a number of these cots. All the walls are double, being sheathed, papered, and then covered with flooring. The doors are also double. These cots cost about $40 each. Less substantial cots of the same shape may be built for much less money.

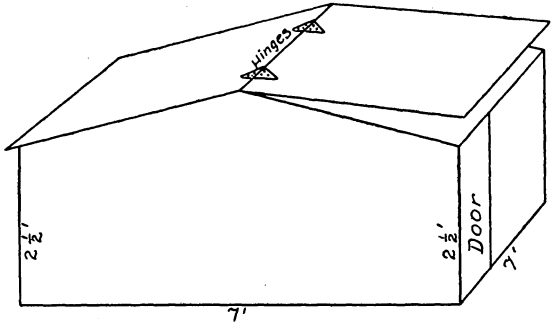


FIG. 17.—A square cot, with hinged roof.

Figure 17 shows a good type of cot in use in southeastern Iowa. The whole south roof is on hinges and can be laid over on the north side. The front wall is a loose panel, which can be quickly removed. The floor is also removable. There are no projections on the ends in order that the cots may be set close together in winter. They are moved by raising and putting a sled underneath.

Figure 18 shows a good cot in south-central Nebraska, with a convenient knockdown pen. Skids 4 by 6, 9 feet long. Joists 2, 2 by 6,

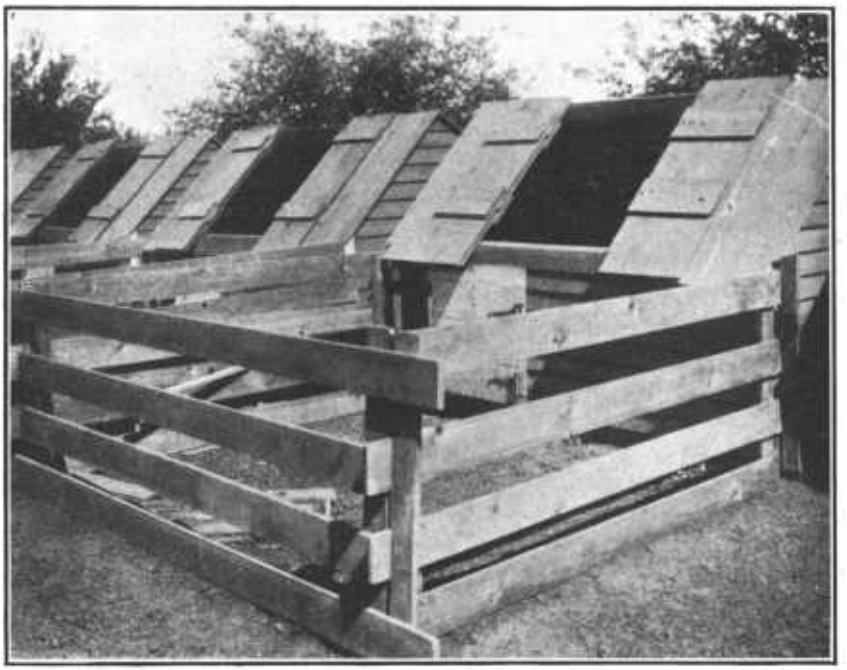
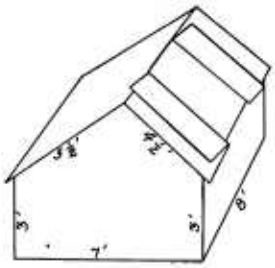
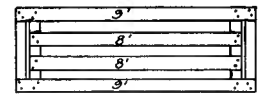


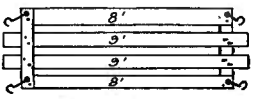
FIG. 18.—A good individual house, with knockdown pen.

laid flat. Walls shiplap, paper and lap siding. Roof doors 18 inches wide. Cost complete, $25 (1908). Figure 19 shows the dimensions of the house and also the panels of the pen.





Front of Pen



Side of Pen

FIG. 19.—Diagram of individual house shown in figure 18, showing dimensions and details of pen construction.

HINTS ON CONSTRUCTION.

FLOORS.

The hog-house floor is an unsettled question. A good floor is the ground with woven wire stretched on top to prevent the hogs from rooting. Electrically welded corncrib wire is very satisfactory. This makes a floor which is easy on the hogs, almost free from rats, and, if properly bedded, warm and dry. It is, however, more difficult to keep

free from dust than some other floors. Many concrete floors are used, but they are cold, liable to be wet, and are hard on the hogs' feet. Often almost an entire pig crop and many sows are lost by taking cold on concrete floors. Concrete floors are, however, very satisfactory when covered with plank overlays, or false floors, which should be raised from the concrete about an inch by nailing cleats on the under side, as shown in figure 20. The wood portion of this floor consists of 2 by 4 inch timbers laid about one-fourth inch apart to allow drainage.

Board floors are expensive, short lived, cold if up off the ground, and make the worst kind of rat harbors. The writer once visited an old hog house with wood floor in which the owner said the rats had gotten over half the pigs. Several men report that rats may be kept out by packing sand or cinders to the top of the joists before laying the floor, but these materials are often too expensive to be used for this purpose.

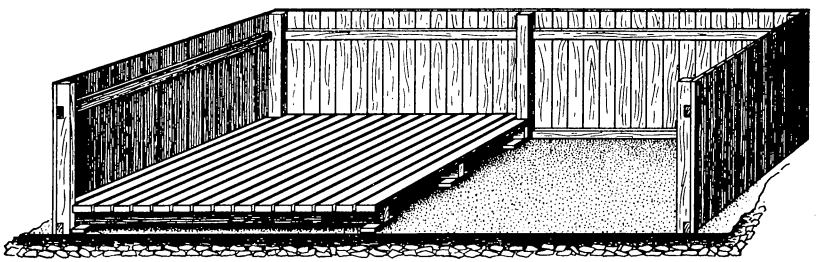


FIG. 20.—Pen, showing concrete floor with removable wood overlay.

PARTITIONS.

In making the inside partitions, care should always be taken to have them perfectly tight at the floor and for about 10 or 12 inches above, so that young pigs can not crawl through, and so sows in the adjoining pens can not get hold of them and pull them through. A sow will often pull a newly born pig through under a partition and eat it, when, if the pig was in the pen with her, it would be perfectly safe. Above the first 10 or 12 inches it is better to have the partitions open enough so the hogs can see out, otherwise at every sound the sows will be up on the partitions to see what is going on.

Pig rails or guardrails should be placed on the inside of the pen, from 6 to 10 inches from the floor, according to the size of the sow, and should stand out 6 or 8 inches to prevent the sow from mashing the pigs against the wall.

It will be found convenient to have the alley gates removable by lifting out. It is sometimes helpful, also, to have part or all of the partition fences removable. All partitions should be 30 to 36 inches high.

Six by 8 feet is generally found to be a very satisfactory size for pens, but if feeding is to be done inside, the pens will need to be longer in order to give room to feed and water without getting the bed befouled. Very large sows, such as are sometimes kept by breeders, may need more room, but the producer of pork will not need a larger pen. Small sows do not need this much room, and it might be good economy to make half of the pens 5 feet wide. Five by 8 feet will accommodate a small sow very well.

Hog doors should be 22 to 23 inches wide and 30 to 31 inches high in the clear. In cold weather a piece of burlap or ducking hung at the top of the hog door, with a stick a little shorter than the width of the door nailed across the bottom to prevent the wind from blowing it back, will help materially to keep the pigs warm. The pigs will soon learn to lift the curtain when they want to go through. The board doors in cots would not then need to be closed except in very bad weather, or while the pigs are very small.

VENTILATION.

In most cases, either ventilation is lacking or the house is drafty. In a well-ventilated, double-walled building, little moisture will gather on the walls even in very cold weather, while in a poorly ventilated one thick coats of frost will often gather, and the whole house will be damp when the frost melts. It is not easy to secure a good supply of fresh air and prevent all drafts from striking the pigs. There are, however, several quite satisfactory methods of ventilation in use. The commonest one is to make some of the windows so they will either slide or swing on hinges. The box ventilators shown in figures 9 and 10 are very satisfactory. The cloth curtain window also does good work.

WHITEWASHING.

Whitewashing the inside of the house is an excellent practice. Besides going a long way toward disinfecting, it increases the light materially. When the sunshine strikes a whitewashed wall, much of it is reflected to the floor and does a great deal of good. Dark houses which must be used will be much improved by whitewashing.

WHERE TO PLACE WINDOWS IN HOG HOUSES.

The following tables, prepared at the United States Naval Observatory, will enable the reader to determine at once how the windows in a hog house should be placed in order to secure the maximum sunshine in the pens at any desired time from January to May. The tables show the height (at top) necessary for windows to be in order that the sun may strike the back line of the floor of the pen—at the

given distances north of the window—at 10 a. m., noon, and 2 p. m., on the first day of each month from January to May, inclusive. The calculations are made for every 2 degrees of latitude from 30 to 48 degrees north, and for distances north of the window from 4 feet to 18 feet. This covers all ordinary widths of buildings and all parts of the United States. It is assumed, of course, that the windows front due south.

The outline map of the United States (fig. 21) shows what parts of the country are crossed by each of the parallels mentioned in the tables. By referring to the map anyone can tell approximately what his latitude is, and thus can see what figures in the tables apply to his locality.

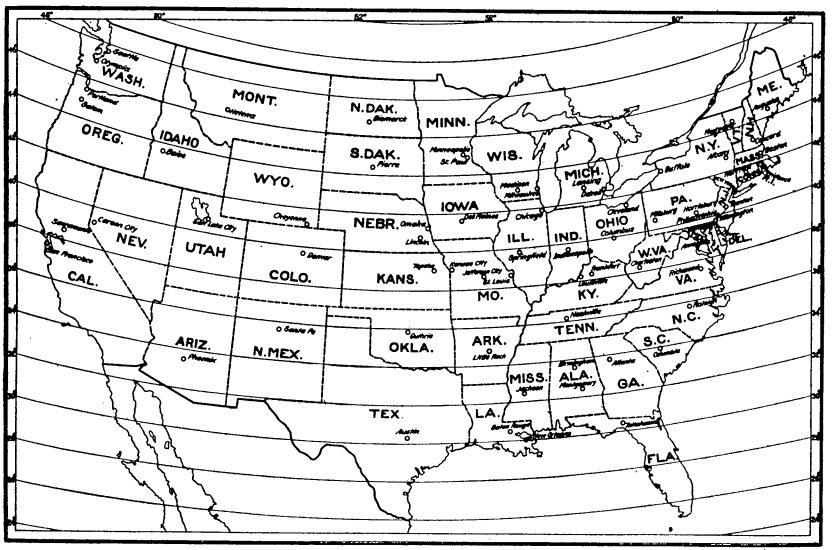


FIG. 21.—Outline map of the United States, showing even parallels of latitude from 26° north to 48° north.

HOW TO USE THE SUNSHINE TABLES.

Suppose a farmer lives at Springfield, Ill., and wishes to put up a hog house 20 feet wide, having pens 8 feet long and the alley 4 feet wide (after the general style of the houses shown in figs. 5 and 7), and wants the pigs to come about March 1. In this case the combined length of the pen and width of the alley (12 feet) represents the distance from the line of the upper windows to the back line of the rear pens. Consequently, in order to locate the proper height for the upper windows he turns to the table under "March 1," finds latitude 40, follows the line across to the column headed "12 feet," and there finds that the top of the window should be 10 feet 6 inches from the ground in order to get the sunshine on the back line of the pen at 10 a. m. and at 2 p. m. In this instance it will be noted

that the sun, being a little higher at noon, does not quite strike the back line at that hour, but goes back there by 2 o'clock.

It may be seen from the above example that under normal conditions—that is, avoiding extremes of latitude and of season—the information given in the tables is of much practical value. Where, however, we take Florida for May 1, or northern Minnesota for January 1, we find conditions that are not practicable, because in the first case the windows would have to be too high and in the second too low.

JANUARY 1.

Latitude.	Distance from window line (at floor) to north end of pen.							
	4 feet.		6 feet.		8 feet.		10 feet.	
	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.
	Height of window.							
	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft in.	Ft. in.	Ft. in.	Ft. in.
30 degrees N.	3 0	2 8	4 6	4 0	6 0	5 4	7 6	6 9
32 degrees N.	2 10	2 6	4 2	3 9	5 7	5 0	7 0	6 3
34 degrees N.	2 7	2 4	3 11	3 5	5 2	4 7	6 6	5 9
36 degrees N.	2 5	2 1	3 7	3 2	4 10	4 2	6 0	5 3
38 degrees N.	2 3	1 11	3 4	2 11	4 5	3 10	5 6	4 10
40 degrees N.	2 0	1 9	3 1	2 8	4 1	3 6	5 1	4 5
42 degrees N.	1 10	1 7	2 10	2 5	3 9	3 2	4 8	4 0
44 degrees N.	1 8	1 5	2 7	2 2	3 5	2 11	4 3	3 7
46 degrees N.	1 6	1 3	2 4	1 11	3 1	2 7	3 10	3 3
48 degrees N.	1 5	1 2	2 1	1 8	2 9	2 3	3 5	2 10

Latitude.	Distance from window line (at floor) to north end of pen.							
	12 feet.		14 feet.		16 feet.		18 feet.	
	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.
	Height of window.							
	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.	Ft. in.
30 degrees N.	9 0	8 1	10 6	9 5	12 0	10 9	13 6	12 1
32 degrees N.	8 5	7 5	9 9	8 8	11 2	9 11	12 7	11 2
34 degrees N.	7 9	6 11	9 1	8 0	10 4	9 2	11 8	10 4
36 degrees N.	7 2	6 4	8 5	7 5	9 7	8 5	10 10	9 6
38 degrees N.	6 8	5 10	7 9	6 9	8 10	7 9	9 11	8 9
40 degrees N.	6 1	5 4	7 2	6 2	8 2	7 1	9 2	7 11
42 degrees N.	5 7	4 10	6 6	5 7	7 5	6 5	8 5	7 3
44 degrees N.	5 1	4 4	5 11	5 1	6 9	5 9	7 8	6 6
46 degrees N.	4 7	3 10	5 4	4 6	6 2	5 2	6 11	5 10
48 degrees N.	4 2	3 5	4 10	4 0	5 6	4 7	6 2	5 1

FEBRUARY 1.

Latitude.	Distance from window line (at floor) to north end of pen.							
	4 feet.		6 feet.		8 feet.		10 feet.	
	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.
	Height of window.							
	Ft. in.	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*
30 degrees N.	3 8	3 5	5 7	5 1	7 5	6 10	9 3	8 6
32 degrees N.	3 5	3 2	5 2	4 9	6 11	6 4	8 8	7 11
34 degrees N.	3 3	2 11	4 10	4 5	6 5	5 11	8 0	7 4
36 degrees N.	3 0	2 9	4 6	4 1	6 0	5 6	7 6	6 10
38 degrees N.	2 9	2 6	4 2	3 10	5 7	5 1	6 11	6 4
40 degrees N.	2 7	2 4	3 10	3 6	5 2	4 8	6 5	5 10
42 degrees N.	2 5	2 2	3 7	3 3	4 9	4 4	6 0	5 5
44 degrees N.	2 2	2 0	3 4	3 0	4 5	4 0	5 6	4 11
46 degrees N.	2 0	1 10	3 0	2 9	4 0	3 7	5 1	4 6
48 degrees N.	1 10	1 8	2 9	2 6	3 8	3 3	4 7	4 1

Latitude.	Distance from window line (at floor) to north end of pen.							
	12 feet.		14 feet.		16 feet.		18 feet.	
	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.
	Height of window.							
	Ft. in.	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*
30 degrees N.	11 1	10 2	13 0	11 11	14 10	13 7	16 8	15 4
32 degrees N.	10 4	9 6	12 1	11 1	13 10	12 8	15 6	14 3
34 degrees N.	9 8	8 10	11 3	10 4	12 10	11 9	14 6	13 3
36 degrees N.	9 0	8 2	10 6	9 7	12 0	10 11	13 6	12 4
38 degrees N.	8 4	7 7	9 9	8 10	11 1	10 2	12 6	11 5
40 degrees N.	7 9	7 0	9 0	8 2	10 4	9 5	11 7	10 7
42 degrees N.	7 2	6 6	8 4	7 7	9 6	8 8	10 9	9 9
44 degrees N.	6 7	5 11	7 8	6 11	8 10	7 11	9 11	8 11
46 degrees N.	6 1	5 5	7 1	6 4	8 1	7 3	9 1	8 2
48 degrees N.	5 7	4 11	6 6	5 9	7 5	6 7	8 4	7 5

MARCH 1.

Latitude.	Distance from window line (at floor) to north end of pen.							
	4 feet.		6 feet.		8 feet.		10 feet.	
	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.
	Height of window.							
	Ft. in.	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*
30 degrees N.	5 2	5 0	7 9	7 5	10 4	9 11	12 11	12 5
32 degrees N.	4 10	4 7	7 3	6 11	9 7	9 3	12 0	11 7
34 degrees N.	4 6	4 4	6 9	6 6	9 0	8 7	11 3	10 9
36 degrees N.	4 2	4 0	6 3	6 0	8 4	8 0	10 6	10 1
38 degrees N.	3 11	3 9	5 10	5 7	7 10	7 6	9 9	9 4
40 degrees N.	3 8	3 6	5 5	5 3	7 3	7 0	9 1	8 9
42 degrees N.	3 5	3 3	5 1	4 11	6 9	6 6	8 6	8 2
44 degrees N.	3 2	3 0	4 9	4 7	6 4	6 1	7 11	7 7
46 degrees N.	2 11	2 10	4 5	4 3	5 10	5 8	7 4	7 0
48 degrees N.	2 9	2 7	4 1	3 11	5 5	5 3	6 10	6 6

MARCH 1—Continued.

Latitude.	Distance from window line (at floor) to north end of pen.							
	12 feet.		14 feet.		16 feet.		18 feet.	
	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.
	Height of window.							
	Ft. in.	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*
30 degrees N.	15 6	14 11	18 1	17 4	20 8	19 10	23 3	22 4
32 degrees N.	14 5	13 10	16 10	16 2	19 3	18 6	21 8	20 9
34 degrees N.	13 5	12 11	15 8	15 1	17 11	17 3	20 2	19 5
36 degrees N.	12 7	12 1	14 8	14 1	16 9	16 1	18 10	18 1
38 degrees N.	11 8	11 3	13 8	13 1	15 7	15 0	17 7	16 10
40 degrees N.	10 11	10 6	12 9	12 3	14 7	14 0	16 4	15 9
42 degrees N.	10 2	9 9	11 10	11 5	13 7	13 0	15 3	14 8
44 degrees N.	9 6	9 1	11 1	10 7	12 7	12 1	14 2	13 8
46 degrees N.	8 10	8 5	10 3	9 10	11 9	11 3	13 3	12 8
48 degrees N.	8 2	7 10	9 7	9 2	10 11	10 5	12 3	11 9

APRIL 1.

Latitude.	Distance from window line (at floor) to north end of pen.							
	4 feet.		6 feet.		8 feet.		10 feet.	
	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.
	Height of window.							
	Ft. in.	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*
30 degrees N.	8 4	8 7	12 6	12 11	16 8	17 3	20 10	21 7
32 degrees N.	7 8	7 11	11 6	11 10	15 4	15 9	19 1	19 9
34 degrees N.	7 0	7 3	10 7	10 10	14 1	14 6	17 7	18 1
36 degrees N.	6 6	6 8	9 9	10 0	13 0	13 4	16 3	16 9
38 degrees N.	6 0	6 2	9 0	9 3	12 0	12 4	15 0	15 6
40 degrees N.	5 7	5 9	8 5	8 7	11 2	11 6	14 0	14 4
42 degrees N.	5 2	5 4	7 9	8 0	10 5	10 8	13 0	13 4
44 degrees N.	4 10	5 0	7 3	7 5	9 8	9 11	12 1	12 5
46 degrees N.	4 6	4 7	6 9	6 11	9 0	9 3	11 3	11 6
48 degrees N.	4 2	4 4	6 4	6 5	8 5	8 7	10 6	10 9

Latitude.	Distance from window line (at floor) to north end of pen.							
	12 feet.		14 feet.		16 feet.		18 feet.	
	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.
	Height of window.							
	Ft. in.	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*
30 degrees N.	25 0	25 10	29 2	30 2	33 5	34 6	37 7	38 9
32 degrees N.	22 11	23 8	26 9	27 7	30 7	31 7	34 5	35 6
34 degrees N.	21 1	21 9	24 8	25 4	28 2	29 0	31 8	32 7
36 degrees N.	19 6	20 1	22 9	23 5	26 0	26 9	29 3	30 1
38 degrees N.	18 1	18 7	21 1	21 8	24 1	24 9	27 1	27 10
40 degrees N.	16 9	17 2	19 7	20 1	22 4	22 11	25 2	25 10
42 degrees N.	15 7	16 0	18 2	18 8	20 9	21 4	23 4	24 0
44 degrees N.	14 6	14 11	16 11	17 4	19 4	19 10	21 9	22 4
46 degrees N.	13 6	13 10	15 9	16 2	18 0	18 6	20 3	20 9
48 degrees N.	12 7	12 11	14 8	15 1	16 10	17 3	18 11	19 4

MAY 1.

Latitude.	Distance from window line (at floor) to north end of pen.							
	4 feet.		6 feet.		8 feet.		10 feet.	
	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.
	Height of window.							
	Ft. in.	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*
30 degrees N.	14 11	17 7	22 4	26 4	29 9	35 2	37 2	43 11
32 degrees N.	13 0	15 1	19 7	22 8	26 1	30 3	32 7	37 9
34 degrees N.	11 7	13 3	17 5	19 10	23 2	26 5	29 0	33 1
36 degrees N.	10 5	11 9	15 7	17 7	20 10	23 6	26 0	29 4
38 degrees N.	9 5	10 6	14 1	15 9	18 10	21 0	23 6	26 3
40 degrees N.	8 7	9 6	12 10	14 3	17 1	19 0	21 5	23 9
42 degrees N.	7 10	8 8	11 9	13 0	15 8	17 3	19 7	21 7
44 degrees N.	7 2	7 11	10 10	11 10	14 5	15 10	18 0	19 9
46 degrees N.	6 8	7 3	10 0	10 11	13 4	14 6	16 7	18 2
48 degrees N.	6 2	6 8	9 3	10 1	12 4	13 5	15 5	16 9

Latitude.	Distance from window line (at floor) to north end of pen.							
	12 feet.		14 feet.		16 feet.		18 feet.	
	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.	Noon.	10 a. m. and 2 p. m.
	Height of window.							
	Ft. in.	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*	*Ft. in.*
30 degrees N.	44 8	52 8	52 1	61 6	59 6	70 3	67 0	79 0
32 degrees N.	39 1	45 4	45 7	52 11	52 2	60 5	58 8	68 0
34 degrees N.	34 9	39 8	40 7	46 4	46 4	52 11	52 2	59 6
36 degrees N.	31 2	35 2	36 5	41 1	41 7	46 11	46 9	52 10
38 degrees N.	28 3	31 7	32 11	36 10	37 7	42 1	42 4	47 4
40 degrees N.	25 8	28 6	30 0	33 3	34 3	38 0	38 6	42 9
42 degrees N.	23 6	25 11	27 5	30 3	31 4	34 7	35 3	38 11
44 degrees N.	21 7	23 9	25 3	27 8	28 10	31 8	32 5	35 7
46 degrees N.	19 11	21 10	23 3	25 5	26 7	29 1	29 11	32 8
48 degrees N.	18 5	20 1	21 6	23 6	24 7	26 10	27 8	30 2

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Bulletins in this list will be sent free, so long as the supply lasts, to any resident of the United States, on application to his **Senator, Representative, or Delegate in Congress,** or to the Secretary of Agriculture, Washington, D. C. *Because of the limited supply, applicants are urged to select only a few numbers, choosing those which are of special interest to them.* Residents of foreign countries should apply to the Superintendent of Documents, Government Printing Office, Washington, D. C., who has these bulletins for sale. Price 5 cents each to Canada, Cuba, and Mexico; 6 cents to other foreign countries. The bulletins entitled "Experiment Station Work" give briefly the results of experiments performed by the State experiment stations.

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28. Weeds: And How to Kill Them.
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142. Nutrition and Nutritive Value of Food.
144. Experiment Station Work—XIX.
145. Carbon Bisulphid as an Insecticide.
149. Experiment Station Work—XX.
150. Clearing New Land.
152. Scabies of Cattle.
154. Home Fruit Garden: Preparation and Care.
155. How Insects Affect Health in Rural Districts.
156. The Home Vineyard.
157. The Propagation of Plants.
158. How to Build Small Irrigation Ditches.
162. Experiment Station Work—XXI.
164. Rape as a Forage Crop.
166. Cheese Making on the Farm.
167. Cassava.
169. Experiment Station Work—XXII.
170. Principles of Horse Feeding.
172. Scale Insects and Mites on Citrus Trees.
173. Primer of Forestry. Part I: The Forest.
174. Broom Corn.
175. Home Manufacture and Use of Unfermented Grape Juice.
176. Cranberry Culture.
177. Squab Raising.
178. Insects Injurious in Cranberry Culture.
179. Horseshoeing.
181. Pruning.
182. Poultry as Food.
183. Meat on the Farm: Butchering, Curing, etc.
185. Beautifying the Home Grounds.
186. Experiment Station Work—XXIII.
187. Drainage of Farm Lands.
188. Weeds Used in Medicine.
190. Experiment Station Work—XXIV.
192. Barnyard Manure.
193. Experiment Station Work—XXV.
194. Alfalfa Seed.
195. Annual Flowering Plants.
196. Usefulness of the American Toad.
197. Importation of Game Birds and Eggs for Propagation.
198. Strawberries.
200. Turkeys.
201. Cream Separator on Western Farms.
202. Experiment Station Work—XXVI.
203. Canned Fruits, Preserves, and Jellies.
204. The Cultivation of Mushrooms.
205. Pig Management.
206. Milk Fever and Its Treatment.
209. Controlling the Boll Weevil in Cotton Seed and at Ginneries.
210. Experiment Station Work—XXVII.
213. Raspberries.
218. The School Garden.
219. Lessons from the Grain Rust Epidemic of 1904.
220. Tomatoes.
221. Fungous Diseases of the Cranberry.
222. Experiment Station Work—XXVIII.
223. Miscellaneous Cotton Insects in Texas.
224. Canadian Field Peas.
225. Experiment Station Work—XXIX.
227. Experiment Station Work—XXX.
228. Forest Planting and Farm Management.
229. The Production of Good Seed Corn.
231. Spraying for Cucumber and Melon Diseases.
232. Okra: Its Culture and Uses.
233. Experiment Station Work—XXXI.
234. The Guinea Fowl.
235. Preparation of Cement Concrete.
236. Incubation and Incubators.
237. Experiment Station Work—XXXII.
238. Citrus Fruit Growing in the Gulf States.
239. The Corrosion of Fence Wire.
241. Butter Making on the Farm.
242. An Example of Model Farming.
243. Fungicides and Their Use in Preventing Diseases of Fruits.
244. Experiment Station Work—XXXIII.
245. Renovation of Worn-out Soils.
246. Saccharine Sorghums for Forage.
248. The Lawn.
249. Cereal Breakfast Foods.
250. The Prevention of Stinking Smut of Wheat and Loose Smut of Oats.
251. Experiment Station Work—XXXIV
252. Maple Sugar and Sirup.
253. The Germination of Seed Corn.
254. Cucumbers.
255. The Home Vegetable Garden.
256. Preparation of Vegetables for the Table.
257. Soil Fertility.
258. Texas or Tick Fever and Its Prevention.
259. Experiment Station Work—XXXV.
260. Seed of Red Clover and Its Impurities.
262. Experiment Station Work—XXXVI.
263. Practical Information for Beginners in Irrigation.
264. The Brown-tail Moth and How to Control It.
266. Management of Soils to Conserve Moisture.
267. Experiment Station Work—XXXVII.

269. Industrial Alcohol: Uses and Statistics.
270. Modern Conveniences for the Farm Home.
271. Forage Crop Practices in Western Oregon and Western Washington.
272. A Successful Hog and Seed-corn Farm.
273. Experiment Station Work—XXXVIII.
274. Flax Culture.
275. The Gipsy Moth and How to Control It.
276. Experiment Station Work—XXXIX.
277. Alcohol and Gasoline in Farm Engines.
278. Leguminous Crops for Green Manuring.
279. A Method of Eradicating Johnson Grass.
280. A Profitable Tenant Dairy Farm.
281. Experiment Station Work—XL.
282. Celery.
283. Spraying for Apple Diseases and the Codling Moth in the Ozarks.
284. Insect and Fungous Enemies of the Grape East of the Rocky Mountains.
286. Comparative Value of Whole Cotton Seed and Cotton-seed Meal in Fertilizing Cotton.
287. Poultry Management.
288. Nonsaccharine Sorghums.
289. Beans.
290. The Cotton Bollworm.
291. Evaporation of Apples.
292. Cost of Filling Silos.
293. Use of Fruit as Food.
294. Farm Practice in Columbia Basin Uplands.
295. Potatoes and Other Root Crops as Food.
296. Experiment Station Work—XLI.
298. Food Value of Corn and Corn Products.
299. Diversified Farming Under the Plantation System.
301. Home-grown Tea.
302. Sea Island Cotton: Its Culture, Improvement, and Diseases.
303. Corn Harvesting Machinery.
304. Growing and Curing Hops.
305. Experiment Station Work—XLII.
306. Dodder in Relation to Farm Seeds.
307. Roselle: Its Culture and Uses.
309. Experiment Station Work—XLIII.
310. A Successful Alabama Diversification Farm.
311. Sand-clay and Burnt-clay Roads.
312. A Successful Southern Hay Farm.
313. Harvesting and Storing Corn.
314. A Method of Breeding Early Cotton to Escape Boll-weevil Damage.
316. Experiment Station Work—XLIV.
317. Experiment Station Work—XLV.
318. Cowpeas.
320. Experiment Station Work—XLVI.
321. The Use of the Split-log Drag on Earth Roads.
322. Milo as a Dry-land Grain Crop.
323. Clover Farming on the Sandy Jack-pine Lands of the North.
324. Sweet Potatoes.
325. Small Farms in the Corn Belt.
326. Building Up a Run-down Cotton Plantation.
328. Silver Fox Farming.
329. Experiment Station Work—XLVII.
330. Deer Farming in the United States.
331. Forage Crops for Hogs in Kansas and Oklahoma.
332. Nuts and Their Uses as Food.
333. Cotton Wilt.
334. Experiment Station Work—XLVIII.
335. Harmful and Beneficial Mammals of the Arid Interior.
337. Cropping Systems for New England Dairy Farms.
338. Macadam Roads.
339. Alfalfa.
341. The Basket Willow.
342. Experiment Station Work—XLIX.
343. The Cultivation of Tobacco in Kentucky and Tennessee.
344. The Boll Weevil Problem, with Special Reference to Means of Reducing Damage.
345. Some Common Disinfectants.
346. The Computation of Rations for Farm Animals by the Use of Energy Values.
347. The Repair of Farm Equipment.
348. Bacteria in Milk.
349. The Dairy Industry in the South.
350. The Dehorning of Cattle.
351. The Tuberculin Test of Cattle for Tuberculosis.
352. The Nevada Mouse Plague of 1907–8.
353. Experiment Station Work—L.
354. Onion Culture.
355. A Successful Poultry and Dairy Farm.
357. Methods of Poultry Management at the Maine Agricultural Experiment Station.
358. A Primer of Forestry. Part II: Practical Forestry.
359. Canning Vegetables in the Home.
360. Experiment Station Work—LI.
361. Meadow Fescue: Its Culture and Uses.
362. Conditions Affecting the Value of Market Hay.
363. The Use of Milk as Food.
364. A Profitable Cotton Farm.
365. Farm Management in Northern Potato-growing Sections.
366. Experiment Station Work—LII.
367. Lightning and Lightning Conductors.
368. The Eradication of Bindweed, or Wild Morning-glory.
369. How to Destroy Rats.
370. Replanning a Farm for Profit.
371. Drainage of Irrigated Lands.
372. Soy Beans.
373. Irrigation of Alfalfa.
374. Experiment Station Work—LIII.
375. Care of Food in the Home.
377. Harmfulness of Headache Mixtures.
378. Methods of Exterminating Texas-fever Tick.
379. Hog Cholera.
380. The Loco-weed Disease.
381. Experiment Station Work—LIV.
382. The Adulteration of Forage-plant Seeds.
383. How to Destroy English Sparrows.
384. Experiment Station Work—LV.
385. Boys' and Girls' Agricultural Clubs.
386. Potato Culture on Irrigated Farms of the West.
387. The Preservative Treatment of Farm Timbers.
388. Experiment Station Work—LVI.
389. Bread and Bread Making.
390. Pheasant Raising in the United States.
391. Economical Use of Meat in the Home.
392. Irrigation of Sugar Beets.
393. Habit-forming Agents.
394. Windmills in Irrigation in Semiarid West.
395. Sixty-day and Kherson Oats.
396. The Muskrat.
397. Bees.
398. Farm Practice in the Use of Commercial Fertilizers in the South Atlantic States.
399. Irrigation of Grain.
400. A More Profitable Corn-planting Method.
401. Protection of Orchards in Northwest from Spring Frosts by Fires and Smudges.
402. Canada Bluegrass: Its Culture and Uses.
403. The Construction of Concrete Fence Posts.
404. Irrigation of Orchards.
405. Experiment Station Work—LVII.
406. Soil Conservation.
407. The Potato as a Truck Crop.
408. School Exercises in Plant Production.
409. School Lessons on Corn.
410. Potato Culls as a Source of Industrial Alcohol.
411. Feeding Hogs in the South.
412. Experiment Station Work—LVIII.
413. The Care of Milk and Its Use in the Home.
414. Corn Cultivation.
415. Seed Corn.
416. Cigar-leaf Tobacco in Pennsylvania.
417. Rice Culture.
418. Game Laws for 1910.
419. Experiment Station Work—LIX.
420. Oats: Distribution and Uses.
421. Control of Blowing Soils.
422. Demonstration Work on Southern Farms.
423. Forest Nurseries for Schools.
424. Oats: Growing the Crop.
425. Experiment Station Work—LX.
426. Canning Peaches on the Farm.
427. Barley Culture in the Southern States.
428. Testing Farm Seeds in the Home and in the Rural School.
429. Industrial Alcohol: Sources and Manufacture.
430. Experiment Station Work—LXI.
431. The Peanut.
432. How a City Family Managed a Farm.
433. Cabbage.
434. The Home Production of Onion Seed and Sets.
435. Experiment Station Work—LXII.
436. Winter Oats for the South.
437. A System of Tenant Farming and Its Results.