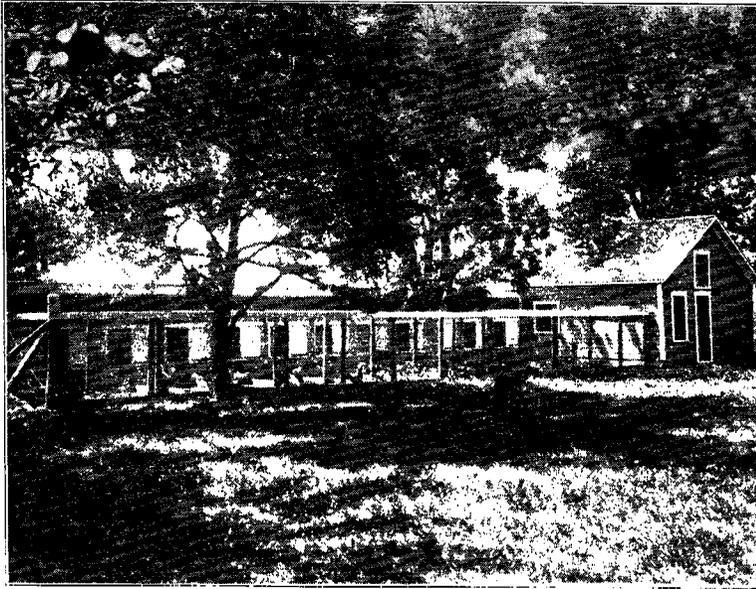

**Kansas State Agricultural College
Agricultural Experiment Station.**

THE HEN'S PLACE ON THE FARM.



Kansas Experiment Station incubator- and poultry-house.

BY
OSCAR ERF.

PUBLISHED BY THE
AGRICULTURAL EXPERIMENT STATION,
MANHATTAN, KANSAS.

Printed by the State Printer,
Topeka, 1907.

BULLETIN No. 150.

THE HEN'S PLACE ON THE FARM.

BY OSCAR ERF.

Not the hen business,
But the business hen.

As THE American people become more wealthy and better educated the coarser articles of diet are supplanted by more wholesome and more palatable foods. Thus it is that the consumption of pork per capita is decreasing, while the amounts of butter and eggs eaten by the average American are nearly twice as great as twenty years ago.

The available figures of the Census Bureau show the growth of this industry in egg production for 1880, 1890 and 1900 as 456, 819 and 1293 millions of dozens, respectively. If valuations were recorded the increase would be in still greater proportion, for the price of eggs has risen during this period. According to the last report of the secretary of agriculture the value of the poultry products of the United States is estimated at \$500,000,000. This value is exceeded only by such products as corn, which comes first, dairy second, and wheat third, poultry and wheat being practically equal. From this it will be seen that the poultry business is rapidly becoming one of the most important industries of the country. In Kansas it is five times as large as it was twenty-five years ago, and is to-day the most rapidly growing farm industry of the state.

MODERN METHODS.

Twenty years ago it was considered unwise to attempt to keep more than 100 or 200 hens on the same farm, but to-day there are poultry-farms scattered throughout New England, New York, New Jersey, Pennsylvania, Ohio, Illinois and California that are keeping many times that number. Many poultry-farms derive their chief source of income from the sale of pure-bred stock and eggs, but there are others which depend wholly upon their market products. While the pro-

duction of poultry on farms entirely devoted to the business is a growing and profitable industry, only a small per cent. of the increased product as shown by statistics above can be accounted for in this way. That the great bulk of the increase comes from the general farm is shown by the fact that in the North Atlantic states, where the great poultry-farms are situated, the gain in eggs produced in a period of twenty years was but 91 per cent., while in Kansas during the same period the gain was 320 per cent.

METHODS OF PRODUCTION IN KANSAS.

In 1900 there were 173,000 farms in Kansas. Ninety per cent. of these reported chickens. The large farms and ranches do not yield as great a value of poultry products, when compared with their total income, as do the smaller farms. Renters and exclusive grain-farmers raise few chickens. Truck-farmers near our larger towns, whose chief crops are vegetables, produce very little poultry. The bulk of the chickens and eggs of Kansas are produced by farmers who own their own homes, whose farms are of moderate size, and who follow a mixed, intensive and permanent line of farming. The shifting man, who hurriedly robs the soil of its accumulated wealth, will never develop the industries upon which the permanent prosperity of the state depends. In many cases exclusive poultry-farming has not proven a success in Kansas, but it must not be inferred that the poultry of the state is produced at a loss. Poultry, as it exists on the average Kansas farm, requires little care and no expense, for the feed used is largely that which would otherwise be wasted, while the labor is generally done at such a time and by such members of the family that it does not interfere with other farm work. Hence the income from the farm poultry of the state is nearly all profit.

The question naturally arises as to what extent the Kansas farmer can increase his chicken business and still make profits under present conditions. This will depend upon the farmer; but it can be said, with reasonable certainty, that the point at which special labor must be employed will mark the safe line of expansion, for poultry work is of such a nature that, save where the markets are most favorable, labor employed for the above purpose will not return a profit. The expense of yarding and feeding may, even before this point is reached,

diminish the profits per hen. Within moderate bounds there is abundant room for the farmer to increase his flock of chickens and add correspondingly to the profits. If he takes equal or greater pains to increase their quality he will add the income to be derived from the sale of breeding stock.

To increase the earnings of chickens there are three lines of poultry-keeping which may be followed. One is the production of standard-bred chickens, which, for those who understand the breeding of high-scoring specimens, is both fascinating and profitable. A second line of poultry work is the production of varieties that shall excel in quality, rapid growth and profitable fattening. This work will be encouraged by the crate-fattening system that is being introduced into the state. The third line of poultry work is breeding for increased egg production. This should be the most important of the three, for the value of eggs sold in the state is about twice that of the chickens marketed. Breeding for egg production is tedious work, but the gain derived for producing better-laying strains well pays for the efforts spent.

HOW BREEDS OF POULTRY HAVE BEEN DEVELOPED.

To one who is familiar with the different types of chickens to be found in a poultry-show room, it seems almost incredible that these varieties should have descended from one parent source. It is, however, thought by scientists that all domestic chickens have been bred from a single species of a jungle fowl of India.

This wild chicken is smaller than the common varieties and is colored in a manner similar to the Black-breasted Game breed. The habits of this bird are like those of the quail and prairie-chicken, both of which belong to the same zoological family.

From its natural home in India the chicken spread both east and west. Chinese poultry culture is ancient. In China, as well as in India, the chief care seems to have been to breed very large fowls, and from these countries all the large, heavily feathered breeds have been imported.

Poultry is also known to have been bred in the early Babylonian and Egyptian periods. Here, however, the progress was in a different line from that of China. Artificial incubation was early developed, and the selection was for birds that pro-

duced eggs continually, rather than for those that laid fewer eggs and brooded in the natural manner.

The Egyptian type of chicken spread to the countries bordering on the Mediterranean, and from southern Europe our non-sitting breeds of fowls have been imported. Throughout the countries of northern Europe minor differences were developed. The French chickens were selected for the quality of the meat, while in Poland the peculiar top-knotted breed is supposed to have been formed. The chief point to be noted in all European poultry is that it differs from Asiatic poultry in being smaller, lighter feathered, quicker maturing, of greater egg-producing capacity, less disposed to become broody, and more active than the Asiatic fowl.

The early American hens were of European origin, but of no fixed breeds. About 1840 Italian chickens began to be imported. These, with stock from Spain, have been bred for fixed types of form and color, and constitute our Mediterranean or non-sitting breeds of the present day. Soon after the importation of Italian chickens a chance importation was made from southeastern Asia. These Asiatic chickens were quite different from anything yet seen, and further importations followed.

Poultry-breeding soon became the fashion, and the first poultry show was held in Boston in the early '50's. The Asiatic fowls imported were gray or yellowish-red in color, and were variously known as the Brahmapootras, Cochin-Chinas and Shanghais. With the rapid development of poultry-breeding there came a desire to produce new varieties. Every conceivable form of cross-breeding was resorted to. The great majority of breeds and varieties as they exist to-day are the results of crosses followed by a few years of selection for the desired form and color. Many of our common breeds still give us occasional individuals that resemble some of the types from which the breed was formed. The exact history of the formation of the American or mixed breeds is in dispute, but it is certain that they have been formed from a complex mixing of blood from both European and Asiatic sources. Thus we see that the fundamental traits of our modern breeds are the result of centuries of development along certain fixed lines.

Although good results have come from cross-breeding in the past, as it now stands the field has been thoroughly worked,

and further mixing of already mixed blood gives small chance of further improvement. More careful selection of individuals is now the method to use in improving poultry.

THE MODERN BREEDS.

The following discussion of the breeds of poultry is based upon Kansas conditions. As we change our methods of growing and fattening chickens, and as new markets are found for Kansas poultry products, it is highly probable that new breeds will be introduced and new variations established.

It can hardly be doubted that some of the French breeds of chickens are better table fowls than the breeds of this country, but for the present it will be better policy for the farmer to consider such breeds as are well-enough established in the state to prove themselves profitable under Kansas farm conditions.

The three classes here considered are the Asiatic, the Mediterranean or non-sitting, and the American or general-purpose breeds.

Asiatic Breeds.

The Asiatic breeds deserve mention more because of what they have accomplished than for their present worth as farm chickens. Before the introduction of Asiatic fowls our American chickens were as small as Leghorns, but lacked the particular good traits possessed by the small breeds of the present time. The Asiatic blood has increased the size of the average American hen. This result has been accomplished both by direct crosses of Asiatic mongrel stock and by the formation of American breeds.

Brahmas. —The Light Brahma is the oldest and perhaps the best known of the feather-legged chickens. Size is the quality that recommends the Light Brahma. Where large and slowly maturing fowls fill the bill, the Light Brahma has no superior; but this slowness of maturity is very objectionable in the pullets, which, together with the fact that they are not heavy layers when matured, practically bars this breed where egg production is the chief item. Winter egg production is simply a matter of comfort. The Brahma does not suffer from the cold so readily, and hence will lay in cold weather, but at no time will Brahmas lay as well as smaller hens properly cared for.

Cochins. —The Buff Cochin was the first buff breed, and is

yet more generally known than the other breeds of this color. The Cochin has been used like the Brahma in grading up the size of the scrub stock. The pure-bred Cochin is even a less practical fowl than the Brahma, but as a pet or object of fancy breeding nothing calls forth more admiration than the abundantly feathered Cochin.

Langshans. — This breed is from the north of China, and is the smallest and quickest maturing of Asiatic chickens. If any person from whim or fancy desires the feather-legged chickens for general farmer's fowls, this is the most suitable breed. Their black color, white skin and feathered legs are in most cases, however, objectionable, and as the Langshans do not excel the American breeds in any practical qualities they can hardly be expected to increase in popularity as farm chickens.

The Non-sitting Breeds.

The non-sitting breeds of chickens include many types from all over Europe, but the ones which have become well established in this country as practical breeds are those that were imported from the countries bordering on the Mediterranean.

The Leghorns. — The Leghorns are represented by many varieties, but the White and Brown are the best-established and most popular. Between these two it is impossible to say which is the better hen. Another variation within the Leghorn family is the distinction of single and rose-combs. The benefit claimed for rose-combs is a freedom from frost-bite, but the single-comb varieties are better established and more popular. Exceptions will, of course, be found, but as far as the breed is concerned the Leghorns are without doubt the best layers known. Leghorns are also the most highly organized nervously of any breed. For this reason they fail very quickly to produce good results when subject to unfavorable conditions. Leghorns, if compelled to roost in cold houses and pick a living from the slush of a barn-yard, will not lay. But when warmly housed and properly fed they are the best of winter layers.

The two principal objections raised against Leghorns are wildness and small size. The Leghorn cockerels should be sold when three months old, for if kept longer they will prove a source of loss. But while the small size of the young cockerel is a source of loss, the same thing in the hen is a decided advantage, for the smaller consumption of food during the

lifetime of a hen more than offsets her smaller price when finally sold. The best-bred Leghorns are practically non-sitters, and should not be counted on to rear their young. This is perhaps the chief reason why the Leghorn is not adapted to the average farm. For those who are so situated that they can hatch and rear their pullets artificially, or with hens of other breeds, and who give their hens suitable care in winter, the Leghorn will prove a very profitable breed for the farm.

The Minorcas.—The Minorcas are much larger than the Leghorns, and lay larger eggs. They have white skin and black shanks, which are objections. Black is the best-established color, but the White variety is also bred. Minorcas are similar to the Leghorns in productiveness and temperament, but have no points of superiority over the Leghorns except size.

The American or General-purpose Breeds.

The American breeds have been made by the mixing of the types discussed under the previous heads. They have been formed to meet the demand for a general-purpose chicken, and they fulfil this demand better than any breed thus far considered. These breeds are more variable in traits than breeds with more years of uniform ancestry to their credit. If strict selection is not maintained the American varieties are inclined to vary and revert to ancestral types. This would at first seem a disadvantage, but in the hands of a careful breeder this tendency to vary may be turned to good account in improving the breed.

The Plymouth Rocks.—The Barred variety of the Plymouth Rocks is the original Plymouth Rock, and is, perhaps, all things considered, the most popular breed in this country at the present time. Its origin is commonly given as a cross between the Black Java and the American Dominique. Besides the Java other Asiatic blood has probably been used in making the breed. The Plymouth Rock is more like the Asiatic than like the European chicken. It approaches in size and fattening qualities the Cochin or Brahma, but has lost the excessive feathering, slowness of growth, and general clumsiness of those breeds. The greatest recommendation for the Plymouth Rock on the farm is the excellent growth made by the young chickens. In this quality they have no superior. The Plymouth Rock pullets are good layers, but as yearling hens are prone to

turn the feed into fat rather than eggs. Another objection to the Barred variety is the difficulty in keeping the breed true to the standard type. The pure-bred birds are required to have even and distinct bars of the same shade in male and female. These are difficult points to maintain, and resort is often made to double mating or the keeping of two breeding pens, one to produce cockerels and the other pullets.

The White and Buff Plymouth Rocks are later products than the Barred variety. Much of what has been said will apply to these also. The following differences might be noted: The White variety is free from the color objection of the Barred type, but the objection to the fattening tendency applies to hens of this variety perhaps more forcibly than to the Barred. Buff Plymouth Rocks will probably average smaller than the other varieties of the breed. Although a solid-colored bird, they, like all buff breeds, except the Buff Cochins, will be found difficult to breed of one color, owing to the tendency to possess black or white in the wings and tail.



"An Egg Type," White Wyandotte Hen. The best individual layer of the 1905 laying contest.

Wyandottes. —The Wyandottes were originated, like the Plymouth Rocks, from a mixture of Asiatic and European chickens. Dark Brahmas and Buff Cochins are said to have been crossed with Sebright Bantams and Silver- and Golden-spangled Hamburgs. The intention was to produce larger breeds with the beautiful color and markings of the Sebright and Hamburg fowls. Thus the Silver- and Golden-laced Wyandottes were formed. As fanciers' fowls they have since maintained much popularity and have been scattered in considerable numbers to our farms. But it remains for a later variety, the White Wyandotte, to gain the greatest popularity for the breed. The Buff Wyandotte is also coming into recognition. As to color, the Laced, White and Buff Wyandottes occupy similar positions to the corresponding colors in the Plymouth Rock breed. The Wyandotte is smaller than the Plymouth Rock, but an equally rapid grower. It is generally claimed that the White Wyandotte will stand pushing for rapid growth the best of any breed. As layers the Wyandottes seem to rank about with the Plymouth Rocks, but being somewhat more active and having less tendency to overfatness they should be credited with a slight advantage.

Rhode Island Reds. —This breed constitutes the latest addition to the list of popular American breeds of chickens. This variety differs from the majority of breeds in claiming for themselves an origin based solely on practical considerations. They are partly of Asiatic blood, but in their selection, which extends over a period of fifty years, attention has been paid to rapid growth and egg production, so that the breed to-day more nearly resembles the Leghorns than does either the Plymouth Rock or Wyandotte. One fundamental difference still exists that shows the Asiatic origin of the red chicken, they being persistent sitters. The Rhode Island Reds do not reproduce themselves with certainty as to shade of color or style of comb, but in practical points they may be considered a distinct and well-established breed.

EXHIBITION AND JUDGING OF POULTRY.

Poultry shows are held in connection with general agricultural fairs in the fall of the year, or as separate exhibitions in the early part of the winter. Any community may organize a poultry association and conduct a show.

Fowls contesting for prizes are entered as single specimens

or in pens consisting of a male and four females. Chickens are exhibited as cocks, hens, cockerels and pullets, the latter classes being specimens less than one year of age. The judging may be by direct comparison of the birds or by the use of a score-card. The latter is a customary method in Kansas shows.

The following is a reproduction of the official score-card, as given in the Standard of Perfection :

OFFICIAL SCORE-CARD OF THE AMERICAN POULTRY ASSOCIATION.

Date Variety
 Owner Sex
 Address Band No.
 Entry No. Weight

	Shape.	Color.	Remarks.
Symmetry			
Weight or size			
Condition			
Head and beak			
Eyes			
Comb			
Wattles and ear-lobes			
Neck			
Back			
Tail			
Wings			
Breast			
Body and fluff			
Legs and toes			
Hardness of feather*			
Crest and beard †			

Total cuts Score
 Judge, Secretary

*Applies to Games and Game Bantams.
 †Applies to crested breeds.

POPULARITY OF THE VARIOUS BREEDS AMONG FANCIERS.

The cause of the popularity of the various breeds of fowls among poultry fanciers may be assigned to two factors: First, love for the beautiful, new or unique; second, utility, without which sales cannot be made to those who raise poultry for market. Because of the last consideration the breeds which are primarily practical chickens claim a majority even among breeders whose sole object is the production of show-room specimens. In order to give some idea of the distribution of

the breeds among the fanciers of the country the following table has been prepared. The first column gives the number of birds entered in the World's Fair Poultry Show, held at St. Louis, in 1904. The second column contains the number of persons advertising the variety in one issue of a leading poultry paper of the central West. The less important varieties are combined under a single heading to economize space.

BREEDS.	Entries.	No. ad- vertising.
Barred Plymouth Rocks.....	428	196
White Plymouth Rocks.....	484	104
Buff Plymouth Rocks.....	524	66
White Wyandottes.....	847	177
Silver-laced Wyandottes.....	174	25
Golden-laced Wyandottes.....	169	21
Buff Wyandottes.....	158	26
Black, Penciled, and Partridge Wyandottes.....	218	31
Miscellaneous American varieties.....	158	44
Light Brahmas.....	180	32
Dark Brahmas.....	64	3
Buff Cochins.....	139	19
White Cochins.....	29	6
Black Cochins.....	75	2
Partridge Cochins.....	78	14
Black Langshans.....	162	25
White Langshans.....	37	5
Single-comb Brown Leghorns.....	299	68
Rose-comb Brown Leghorns.....	70	32
Single-comb White Leghorns.....	405	110
Rose-comb White Leghorns.....	143	23
Single-comb Buff Leghorns.....	145	22
Black and Silver Duck-winged Leghorns.....	46	5
Minorcas, all varieties.....	156	61
Spanish, Andalusians and Anconas.....	124	16
Dorkings, Redcaps and Orpingtons.....	192	46
Polish, all varieties.....	215	3
Hamburgs, all varieties.....	201	15
Houdans, Crevecoeurs, and La Fleche.....	109	6
Games, Game Bantams, etc.....	378	28
Bantams and ornamental breeds.....	655	17
Non-standard varieties.....	621	76
Total Plymouth Rocks.....	1,436	366
Total Wyandottes.....	1,566	280
Total American varieties.....	3,160	690
Total Asiatic varieties.....	766	106
Total Mediterranean varieties.....	1,388	337

THE FAVORITE BREEDS AT COMMERCIAL POULTRY PLANTS.

In the eastern part of the United States are many farms keeping from one to several thousand hens and devoted exclusively to the production of poultry and eggs for the market. The use of any breed on such farms should be good witness of its utility. The tabulation of the breeds used on such plants as are known to the writer gives the following results: White Wyandottes occupy first place, being used on about twice as many plants as any other one breed. Single-comb White Leghorns, Barred Plymouth Rocks and White Plymouth Rocks follow next in order. Rhode Island Reds, Light Brahmas, Buff Wyandottes, Buff Plymouth Rocks, Brown Leghorns and Black Minorcas are the other breeds in use. Leghorns, Minorcas and Rhode Island Reds are used on the egg farms, Light Brahmas and Plymouth Rocks on the roaster and capon plants, while the broiler and combination plants use Plymouth Rocks, Wyandottes or Rhode Island Reds.

DISTRIBUTION OF BREEDS ON KANSAS FARMS.

The varieties of poultry bred on the farm seldom include ornamental varieties, and new breeds are not as well represented as in the yards of the fancier. As an illustration of this point attention is called to the fact that in the show-room White Wyandottes equal or exceed in number the Barred Rocks. On the farms, however, the Barred Rocks are many times as numerous as the White Wyandottes. An effort was made by a representative of the Experiment Station to determine approximately the proportion of the breeds of chickens on the Kansas farms. The subject was investigated in two ways: First, by ascertaining, from question blanks sent to farmers or by personal visits to farms, the variety of chickens kept; second, from the opinions of poultry packers and by actual count of the chickens in receiving-rooms of poultry-packing establishments. It should be borne in mind that the word "variety," used in this connection, does not mean pure-bred chickens. From the studies made the conclusion is drawn that about ten per cent. of the poultry upon Kansas farms are entitled to be called pure-bred. The great preponderance of Kansas chickens are crosses and grades in which one breed predominates. Poultry in which the crossing has been so confused that the product cannot be classified are listed as

mongrels. The following table shows the result of this investigation :

BREEDS.	No. farms keeping variety.	Total of variety in packing plant.
Barred Plymouth Rocks.....	113	1080
Brown Leghorns.....	30	139
Black Langshans.....	24	72
White Leghorns.....	17	124
Light Brahmans.....	9	54
White Plymouth Rocks.....	8	40
Buff Plymouth Rocks.....	5	26
White Wyandottes.....	5	38
Buff Wyandottes.....	2	10
Buff Cochins.....	2	25
White Langshans.....	2	.....
Silver Wyandottes.....	2	15
Partridge Cochins.....	1	.....
Houdans.....	1	8
Black Spanish.....	1	5
Golden Wyandottes.....	1	.....
Mongrels.....	17	250

POULTRY PACKERS' OPINIONS OF THE BREEDS.

In order to get definite information upon this question nine poultry-packing establishments, distributed throughout the central and eastern portions of the state, were visited, and the conclusions are as follows :

For dressed fowl (hens) Barred Plymouth Rocks hold unquestioned first rank. For broilers or roasters the White Plymouth Rocks and the White Wyandottes are considered equally good. By some packers the White Wyandottes are ranked first for broilers. One man stated that White Rocks were more rangy and coarser framed than the Barred variety, otherwise no objection was found with the White or Buff Plymouth Rocks. The extreme popularity of the Barred Rocks is illustrated by the fact that one dealer agreed to pay one-half cent per pound more for this variety than for other chickens. This was, however, discontinued. The only criticism raised against the Wyandottes, when compared with the Plymouth Rocks, was that of smaller size. One packer expressed a preference for Silver over White Wyandottes. As to other American breeds no opinions were expressed.

Outside of the American varieties, the Indian Games are ranked highest by those who include them in the list. The Leghorns are disliked for their small size, but are invariably

ranked above scrub chickens of a similar size. The Leghorns are especially desired for their yellow skin and legs and plump bodies. Some dealers claim that they equal any chicken where the trade demands a small carcass. It was also remarked that Leghorn hens continue to grow and to improve in appearance with age, ranking better as an old hen than as a pullet. The Leghorn cockerels are desirable as broilers but when older are not wanted, and, if purchased, are classed as staggy. Of the Asiatic chickens the Langshans are the most popular, Brahmas next and Cochins last. The Langshans are well liked except for color, being sometimes mentioned next to the Plymouth Rocks. The Brahmas, and more especially the Cochins, are remarkably unpopular among the Kansas packers. This fact is especially worthy of notice when it is remembered that these breeds are spoken of as meat breeds by many poultry writers. The chief objection is because these varieties possess a large frame with not enough meat to cover it. As capons the Brahmas and Cochins are considered among the best.

The following are representative lists, as ranked by packers :

- | | | |
|---------------------------|----------------------|-----------------------|
| 1. Barred Plymouth Rocks. | 1. Barred Rocks. | 1. Barred Rocks. |
| 2. Wyandottes. | 2. White Wyandottes. | 2. Silver Wyandottes. |
| 3. Other Plymouth Rocks. | 3. White Rocks. | 3. Indian Games. |
| 4. Brown Leghorns. | 4. Black Langshans. | 4. Langshans. |
| 5. White Leghorns. | 5. Leghorns. | 5. Leghorns. |
| 6. Langshans. | 6. Brahmas. | 6. Brahmas. |
| 7. Brahmas. | 7. Cochins. | 7. Mongrels. |
| 8. Cochins. | 8. Scrubs. | |

SHOULD THE FARMER HAVE STANDARD-BRED POULTRY?

Pure-bred animals are those that reproduce their form, habits, or other distinctive qualities with uniformity. In order that we may get offsprings like the parent and like each other we must have animals whose ancestors for many generations back have been of one type. The more generations of such uniformity, the more certain it will be that the young will possess similar quality. The wild animals of any one kind or species in one locality have been of similar type for many generations and may be considered as pure-bred. By the law of natural selection, individuals not suited to live in that particular locality have been weeded out. When animals are domesticated, and moved to other climates, and are fed different foods, only such individuals will live and produce young as are suited to the new conditions. But another factor changes

domestic animals more rapidly. Men breed only such specimens as please their fancy; and this artificial selection replaces natural selection. During the many centuries of domestication the chickens of different parts of the world have developed into different types. When these radically different types are brought together and crossed we have produced young that are very different from the parents and from each other. Nor can these young be depended upon to reproduce offspring like themselves. They are said to be cross-bred, or, if the mixing be for several generations, they are known as mongrels. By selecting from cross-bred or mongrel stock such chickens as are desired, and breeding these together for many generations, new breeds may be established.

One strain of chickens may be selected for uniform color of feathers, another for a certain size and shape, another for laying large eggs of a certain color, and yet another strain for being producers of many eggs. Each of these strains might be well-bred in these particular traits, but would be mongrels when the other considerations were taken into account. Breeders of pure-bred stock, in making their selection of breeding animals, try to consider the desirable qualities in due order of their relative importance. Thus, with trotting-horses speed is given prominence above everything else, while in the case of swine or beef-cattle attention has been given to the qualities of growth and fattening that make for the profitable production of meat. Only such uniformity of color and minor points are demanded as will serve to distinguish the breed and give uniformity of appearance. The standards adopted by breeders of this class of animals give relatively small consideration to fancy points, whereas poultry-breeders consider about one-half of the value of their birds to depend on color of feathers alone, while the judgment of shape is based upon the outline produced by the feathers and not on the true body shape. The standard-bred poultry fanciers have not been mainly concerned in producing breeds of chickens for the use of the farmer or practical grower, as have been the breeders of cattle and swine. Men who pursue animal breeding for pleasure alone do not choose large, slow-breeding animals, such as cattle; neither do animals wholly worthless from other standpoints receive much attention from breeders. But the hen, variable in form and color, inexpensive to secure, readily

reared, and capable of producing in brief time large numbers of offspring, and yet withal capable of paying her way in food products, has rendered possible the development of the fancy- or standard-bred chicken business into the most universal and important fancy- or artistic-breeding business in the world.

From this attention that has been given to the breeding of poultry for the show-room, many people wrongly infer that standard-bred poultry is no better than mongrel stock for commercial purposes. The mongrel chicken is a production of chance. Its ancestry represents everything available in the barn-yards of the neighborhood, and its offspring will be equally varied. In the pure breeds there has been a rigid selection practiced that gives uniform appearance. The size and shape requirements of the standard, although not based on the market demands, come much nearer producing an ideal carcass than does chance breeding. Ability to mature for the fall shows is a decidedly practical quality that the fancier breeds into his chickens. Moreover, poultry-breeders, while still keeping standard points in mind, have also made improvements in the laying and meat-producing qualities of their chickens. Considering these facts it is an erroneous idea to think that mongrel chickens offer any advantage over pure-bred stock.

The Selection of a Breed.

It has been pointed out that the farmer who wishes to make the most from his chickens should attempt to derive his income from the sale of breeding stock, fattened young chickens, or from eggs. If the farmer has decided which of these lines of production is best suited to his conditions the selection of a breed is a much less confusing problem.

The man who wishes to sell breeding stock and eggs for hatching must consider the opinions of the community and the competing breeders already in the field. The breed of which there is the greatest amount of stock sold will not of necessity be the best breed for the beginning fancier to select. On the other hand, the mistake should not be made of taking up with an absolutely new breed, for many such breeds are impractical as farm chickens. Note carefully the breeds which are mentioned favorably in the section on "Commercial Poultry Farms," for on such farms breeds of utility find ready recognition.

The growing demand of the market is for chicken meat in

the form of fattened young chickens. Experience in animal growing would show that the meat of half-grown chickens is more economically produced than that of either the small broiler or the matured fowl. No better suggestion can be found for the selection of meat-producing breeds than the opinion of expert fatteners given in the section on "The Crate-fed Chicken Industry."

The man who desires to keep hens with egg production the primary object must first determine whether he expects his hens to hatch and rear their chickens. If so, his selection should be made from the American varieties. If he expects to use artificial hatchers and brooders the Leghorns have almost unrivaled claim for egg production.

HATCHING CHICKS WITH HENS.

Selecting and Storing Eggs for Hatching.

There are many notions prevalent regarding the relation of the shape of an egg to its vitality and the sex of the forthcoming chicken, but such notions are not based upon fact. Eggs having weak shells that might become broken in the nest, or unusually small eggs, should be discarded. If there are more eggs available than we wish for setting it will be better to select the fresher eggs than to be over-particular about shape and appearance. The eggs for hatching should be placed in a cool, dry location and shifted or rolled about occasionally. Eggs exposed to freezing temperature, if not frozen, may still retain their vitality, but it is generally considered best to keep them at a temperature between 40 and 70 degrees F. If kept too warm, eggs dry out rapidly and will not hold their vitality. A good rule is not to set eggs over two weeks old. The idea that jarring, as by thunder, will injure the hatching of eggs is without foundation; likewise the advice to let eggs rest after shipping has been proven to be groundless.

Setting the Hen.

The two chief losses in sitting-hens are lice and interference of other hens. The practice of setting hens in the chicken-house makes both these difficulties more troublesome. Almost all farms will have some outbuilding situated apart from the regular chicken-house that can be used for sitting-hens. The most convenient arrangement will be to use boxes, and have these open at the top. They may be placed in rows and a plank somewhat narrower than the boxes used as a cover. The nests



Large and small portable colony houses as used at the Kansas Experiment Station.

should be made by throwing a shovel of earth into the box and then shaping a nest of clean straw. Make the nest roomy enough so that as the hen steps into the nest the eggs will spread apart readily and not be broken. When a hen shows signs of broodiness remove her to the sitting-room. This should be done in the evening, so that the hen becomes accustomed to her position by daylight. Place the hen upon nest-eggs and confine her to the nest. If all is well the next evening give her a full setting of eggs.

A practical method to arrange for sitting-hens is to build the nests out of doors, allowing each hen a little yard, so that she may have liberty to leave her nest as she chooses. These nests may be built by using twelve-inch boards set on edge, so as to form a series of small runways about one by seven feet. In one end are built the nests, which are covered by a broad board, while the remainder of the arrangement is covered with lath or netting. The food, grit and water should be placed at the opposite end of the runway. Care should be taken to locate these nests on well-drained ground. Arrangements should be made to close the front of the nest during hatching so that the chicks will not drop out. A contrivance of this

kind furnishes a very convenient method of handling sitting-hens, and if no separate building is available would be the best method to use.

INCUBATORS.

The use of artificial hatching machines has been an important factor in the development of exclusive poultry-farms of this country. The more enthusiastic users of incubators claim that the incubator is as essential to profitable chicken rearing on the farm as the special poultry plants. Before drawing conclusions in the matter we wish to call attention to the following topics :

Incubators on Kansas Farms.

Replies received from 111 Kansas farmers report 21 as having tried incubators. Of these, 6 reported the incubators as being an improvement over hatching with hens; 10 reported the incubator as being successful but not better than hens, while the remaining 5 declared the incubator to be a failure. The farmers who are interested enough to answer these queries would naturally belong to a class more interested in chickens than is the average farmer, and the per cent. reporting incubators is higher than would be the case were all farmers taken into consideration. The results of this inquiry, and of personal visits to farms of the state, lead to the belief that about one-tenth of the farmers of Kansas have tried incubators, and that about as many fail as succeed with artificial hatching.

Essentials of a Good Incubator.

The objects in view in building an incubator are: (1) To keep the eggs at a proper temperature (103 degrees on a level with the top of the eggs). (2) To give the eggs a steady current of pure air. (3) To cause the evaporation of moisture from the eggs at a normal rate. (4) To prevent the eggs from resting too long in one position.

The case of the incubator should be built double- or triple-walled, to withstand variation in the outside temperature. The doors should fit neatly and be made of double glass. The lamp should be of the best material, and the wick of sufficient width that the temperature may be maintained with a low blaze. The most satisfactory place for the lamp is at the end of the machine, outside the case. The method of getting the heat from the lamp to the eggs may be by a tank of hot water or by a circulation of warm air. The first method has in the past

been the more common. The tank of hot water retains the heat and the eggs are less subject to sudden variations in temperature. On the other hand, the hot-water machine does not conform as quickly to the actions of the regulator and is more liable to prolonged overheating. The hot-air machines may be in part heated by the hot lamp fumes passing through the top of the machine, but the more important source of heat is pure warm air which is drawn through a chamber around the lamp-flue and passed directly into the egg-chamber. In this style of incubator the whole result depends upon the lamp and the regulator.

Regulators composed of two metals, such as aluminum and steel, are best. Wafers filled with ether or similar liquid are more sensitive but weaker in action. Hard-rubber bars are frequently used.

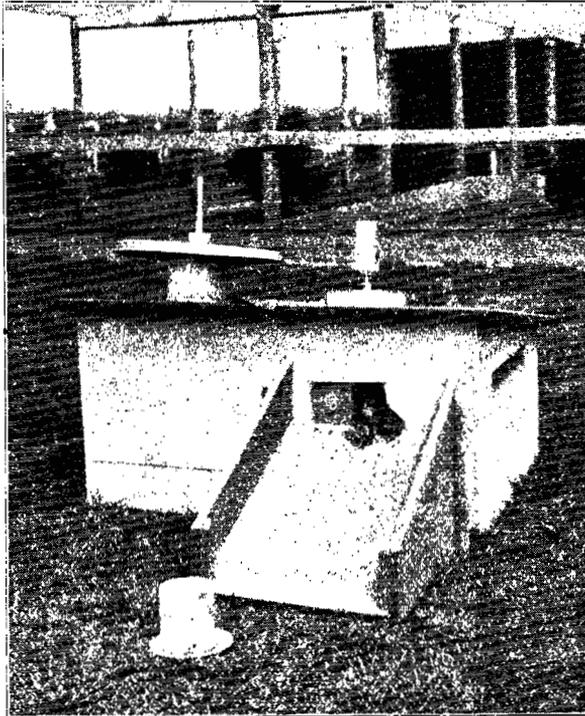
The ventilation of an incubator is of vital importance. The rate of evaporation must also be considered. Eggs lose much of their water during incubation. If the evaporation varies much from the normal amount good hatches cannot be secured. The rate of evaporation is determined by three things: the temperature, the humidity, and the circulation of the air. Theoretically it would be best to supply air at a given rate and containing a certain per cent. of moisture, but in the commercial incubator such an arrangement is impractical.

The most practical system of controlling evaporation is a system of forced ventilation, in which the air is heated around the lamp-flue and passes through the egg-chamber at a rate determined by ventilators in the bottom of the machine. With this system no effort is made to supply moisture to the air, the rate of evaporation being governed wholly by the rate of air circulation. With the outside air cold and dry only a slight current is required, but as the outer air becomes warmer or damper more circulation is needed.

Turning the egg is not the work that many imagine it to be. It is not necessary that the egg be turned with absolute precision and regularity. An elaborate device for this work is useless. The trays will need frequently to be removed and turned around or shifted, and the eggs can be turned at this time by lifting out a few on one side of the tray and rolling the others over.

Another point to be considered in an incubator is that it

has a suitable nursery or place for the newly hatched chicks to drop into after hatching. A good incubator thermometer is also essential.



Front view of brooder used at the Kansas Experiment Station.

Conditions of Profitable Incubator Operations.

The person to run the incubator is the first condition of its success. A good incubator requires attention twice a day. One person should give this attention, and must give it regularly and carefully. The farmer's wife or some younger member of the family can often give more time and interest to this work than can the farmer. The likelihood of a person's success with artificial hatching can best be determined by himself.

The best location for an incubator is a cool, dry cellar. The next choice would be a room in the house away from the fire or from windows. Drafts of air blowing on the machine are especially to be avoided. Not only do they affect the temperature directly, but cause the lamp to burn irregularly, and this may result in fire. Many cellars are too damp for incu-

bation. This is especially true in warm weather. This condition can in a measure be remedied by allowing more ventilation to both cellar and incubator.

The size of incubators which can be profitably used will depend upon the number of hens kept for brooding purposes.

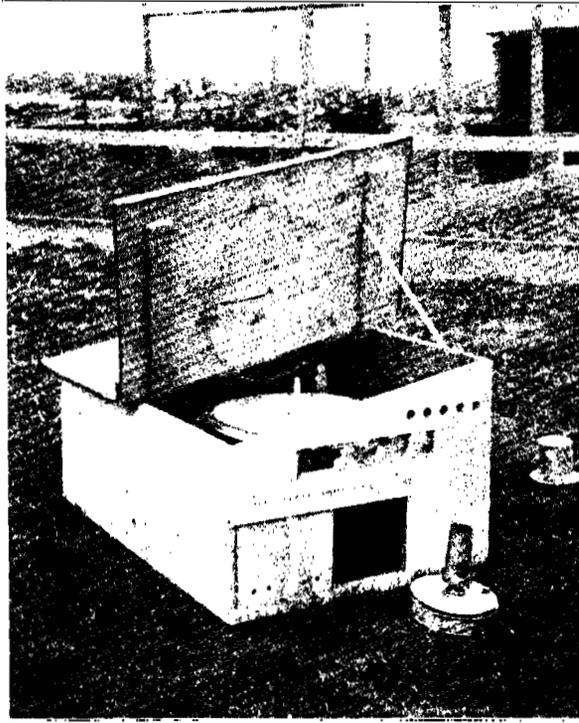
A final condition of success with an incubator is not due to the incubator at all, but to the ability to successfully rear chickens after they are hatched. There is a prevailing notion that incubator chicks are weaker than hen-hatched chicks. This, however, is not necessarily true. Many of the prize-winners of our poultry shows, as well as the choicest market fowls, are hatched in incubators. The fault with incubator-hatched chicks lies in the treatment after hatching. It is true that some people will succeed as well with brooder chicks as with chicks with hens, but the majority will find the hen the better mother. In buying an incubator it would be best to purchase at least one brooder. Try this one, and if you succeed with it you can purchase others. If you rear all your chicks with brooders you will need one brooder to each hundred of the egg capacity of your incubators.

REARING CHICKENS.

Chicks with Hens.

If it is very early in the spring, and the ground is damp, it is best to put the hen and her brood in some building. During the most of the season the best thing is an outdoor coop. The first consideration in making a chicken-coop is to see that it is rain-proof and rat-tight. The next thing to look for is that the coop is not air-tight. Let the front be of rat-tight netting or heavy screen. The same general plan may be used for small coops for hens, or for larger coops to be used as colony-houses for growing chickens. The essentials are: a movable floor raised on cleats, a sliding front covered with rat-tight netting, and a hood over the front to keep the rain from beating in. If these coops are used for large chickens, roosts may be fitted in them. If used late in the fall or early in the spring a piece of cloth should be tacked on the sliding front.

The chicken-coops should not be bunched up, but scattered out over as much ground as is convenient. Neither should they remain long in one spot, but should be shifted a few feet each day. At first water should be provided at each coop, but as the chickens grow older they may be required to come to a few central water pans.



Internal view of the Kansas Experiment Station brooder.

BROODERS.

For those who wish to raise large numbers of early chickens, or who keep only non-sitting breeds, the brooder is a necessity. In buying a brooder the chief points to be observed are: a good lamp, a heating device giving off the heat from a central drum, and an arrangement which facilitates easy cleaning. The brooder should be large, having not less than nine square feet of floor space. The work demanded of a brooder is not as exacting as with an incubator. The heat and circulation of air may vary a little without damage, but they must not fail altogether. The greatest trouble with brooders in operation is the uncertainty of the lamp. The brooder-lamp should have sufficient oil capacity and a large wick. Brooder-lamps are often exposed to the wind, and, if cheaply constructed or poorly enclosed, the result will be a chilled brood of chicks, or perhaps a fire.

The chief thing sought in the internal arrangements of a

brooder is a provision to keep the chicks from piling up and smothering each other as they crowd toward the source of heat. This can be accomplished by having the warmest part of the brooder in the center rather than at the side or corner. If the heat come from above and a considerable portion of the brooder be heated to the same temperature, no crowding will take place.

The temperatures given for running brooders vary with the machine and the position of the thermometer. The one reliable guide for temperature is the action of the chicks. If they are cold they will crowd toward the source of heat; if too warm they will wander uneasily about; but if the temperature is right, each chick will sleep stretched out on the floor. The cold chicken does not sleep at all, but puts in its time fighting its way toward the source of heat. In an improperly constructed or improperly run brooder the chicks go through a varying process of chilling, sweating and struggling when they should be sleeping, and the result is puny chicks that dwindle and die.

The arrangement of the brooder for the sleeping accommodations of the chicks is important, but this is not the only thing to be considered in a brooder. The brooder used in the early season, and especially the outdoor brooder, must have ample space provided for the daytime accommodation of the chick. This part of the brooder must be well lighted and somewhat cooler than the hover. As soon as conditions will permit, get the chickens out on a larger floor, or, better still, on the ground. Keep the chicks scratching in daylight, and sleeping stretched out at night, and the most difficult problem of poultry-raising has been solved.

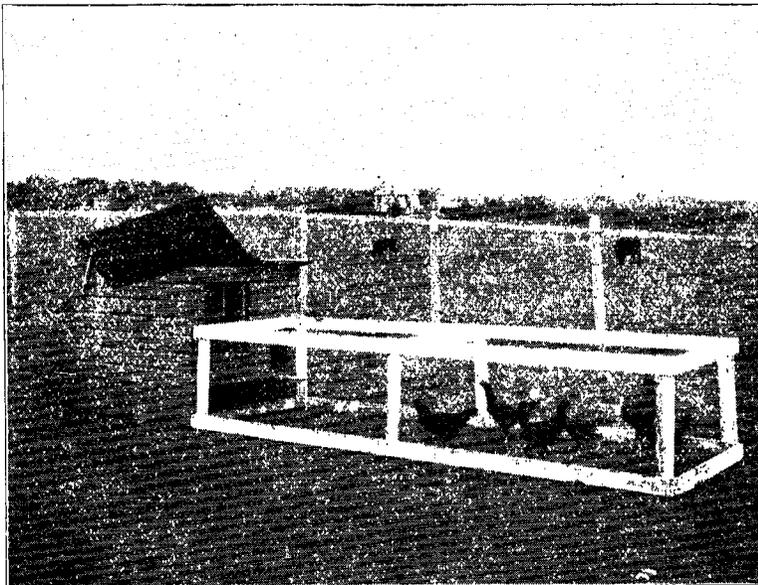
Feeding Young Chicks.

Besides comfortable quarters, the chick, to thrive, must have exercise, water, grit, a variety of grain food, green or succulent food, and casein or meat foods.

Exercise. — Exercise is as essential as food, and lack of it indicates wrong methods of rearing. The natural way for a chick to take its food is to scratch for it, taking a little at a time. If small chickens are put into a box with a bare floor and fed from a trough, they will become weak. Many will become clogged behind with the excrements accumulating on the down, and it is generally concluded that something has

been fed to cause bowel trouble. As a matter of fact they are weak from lack of exercise, and the appearance of diarrhea is only the inability of the chick to properly expel its excrement.

If chicks cannot be out of doors their feeding-floor should be covered with sand, and over this should be thrown some litter, such as chaff from the straw stack or leaves from an alfalfa-loft. Place the feed in this litter. If small quantities are thus given, and given often, the question of exercise is solved. Brooder chicks need more care in this way than do chicks with hens, but even in the latter case it is worth while to make them scratch for their food when they are raised indoors.



Breeding-pen colony house used at the Kansas Experiment Station.

Water.-Water should be provided in shallow dishes. Providing water for brooder chicks is difficult. The brooder is small and generally crowded. The chicks crowd around the water and get each other wet and the floor and litter damp. This can best be avoided by having a dish arranged with an inverted can or bottle which allows only a little water to stand in the drinking basin. Place this device upon a block raised to keep the litter out of the water. Special care must be taken to keep the water dish filled, for if brooder chicks have been

long without water they will crowd around the dish and tramp the weak ones to death.

Grit. —Some form of grit must be supplied to young chicks. Chicks running at large on gravelly ground need no further provision. Chicks on board floors or clay soils must be provided with either coarse sand or chicken grit such as is sold for the purpose. If the grit purchased for the hens in the winter is run over a screen enough small particles can be sifted out to supply young chicks. This at first should be sprinkled on the floor with the feed, but later it may be supplied from a dish.

Grain. —Grain is the principal, and too often the only, food of the chicken. The common way of feeding grain to young chickens is to mix corn-meal and water and feed in a trough or on the ground. There is no particular advantage in this way of feeding, and there are several disadvantages. The feed is all in a bunch and the weaker chicks are crowded out. The food is eaten rapidly and without exercise. When wet feed is thrown on the ground or in a dirty trough chicks must swallow the adhering filth, and if any food is left over it quickly sours and becomes a menace to the health of the chicken. Some people mix dough with sour milk and soda and bake this into a bread. The better way is to feed all, or at least a large part, of the grain in a dry condition.

The notion is prevalent that a chick should begin his diet on boiled eggs, bread and milk, or some other soft food. This notion has probably arisen from the knowledge that most young animals cannot digest hard foods. But when we consider the fact that the natural food of the young mammal is milk, we see why this principle does not apply to chickens.

Little chicks should first be fed when seventy-two to ninety-six hours old. Feed small quantities and as often as is convenient. If the feed is buried in deep litter they must work longer getting it out. The idea is to have them always hungry enough to hunt for food, and always a little food for them to find. If the chicks are at liberty feeding often is not so important—three times a day would be sufficient; while if they roam far in the fields, finding much food, morning and evening feeding is all that is necessary. It is not a matter of great importance just what grain a chicken is first fed. The important thing is that they be supplied with a variety of grain as well as with casein or meat, grit and green food.

There are foods in the market known as chick foods. These commercial foods contain various grains and seeds, together with meat and grit. Their use renders chick feeding quite a simple matter, it being necessary to supply in addition only water and green foods. For those who wish to prepare their own chick foods the following suggestions are given:

Oatmeal is probably the best grain food for chicks. Oats cannot be suitably prepared, however, in a common feed-mill. The hulled oats are what is wanted. They can be purchased as the common rolled oats, or sometimes as cut or pin-head oatmeal. The latter form would be preferred, but either of these is an excellent chick feed. Oats in these forms are expensive and should be purchased in bulk, not in packages. If too expensive, oats should be used only for a few days, when they may be replaced by cheaper grains. Cracked corn is one of the best and cheapest chicken foods. Flaxseed-meal could be used in small quantities. Kafir-corn, wheat, cow-peas—in fact any wholesome grain—may be used to advantage. Farmers possessing feed-mills have no excuse for feeding chicks exclusively on one kind of grain. If there is no way of grinding grain on the farm, oatmeal, millet seed and corn chop can be purchased. At about one week of age whole Kafir-corn, and, a little later, whole wheat, can be used to replace the more expensive feeds.

Green food.—Green or bulky food of some kind is necessary to the healthy growth of young chickens. Chickens fed in litter from clover or alfalfa will pick up many bits of leaves. This answers the purpose fairly well, but it is advisable to feed some vegetable. Fresh grass, lettuce, or alfalfa should be substituted as soon as the season permits.

Casein or meat food.—Chickens are not by nature vegetarians. They require casein or meat to thrive. It has been proven in several experiments that young chickens with an allowance of casein or meat foods make much better growth than chickens with a vegetable diet, even when the chemical constituents and the variety of the two rations are practically the same. Very few farmers feed any meat whatever. They rely on insects to supply the deficiency. This would be well if the insects were plentiful and lasted throughout the year, but as conditions are it will pay the farmer to supplement this source of food with the commercial products, as casein or meat-meal. Fresh bone, cut by bone-cutters, is an excellent source

of the meat and mineral matter needed by growing chicks. If one is handy to a butcher shop that will agree to furnish fresh bones at little or no cost, it would pay to get a bone-mill, but the cost of the mill and labor of grinding are costly items, and unless the supply of bones is certain and convenient this source of meat foods is not to be depended upon.

The best way to feed dried casein or beef-scrap is to keep a supply in the hopper so the chickens may help themselves. In case casein or meat food is given, bone-meal, fed in small quantities, will form a valuable addition to their ration. Infertile eggs from incubators, as well as by-products of the dairy, can be used to help out in the animal-food portion of the ration. Chickens may be given all the milk they will drink. It is generally recommended that this be given clabbered.

The best proteinous feed for chickens is the casein products, such as dried skim-milk or dried buttermilk. This is very rich in protein, and the protein is exceedingly digestible. These products can be very readily obtained from the creamery companies, or can be made on the farm by coagulating the skim-milk, draining off the whey and drying the casein in the sun.

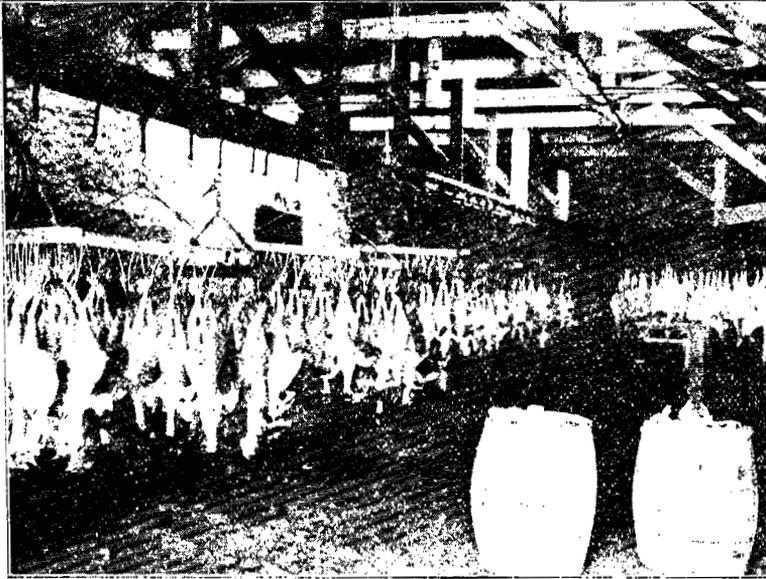
HOW CHICKENS ARE MARKETED IN KANSAS.

At the present time almost the entire poultry crop of Kansas is sold as live poultry. A few farmers dress their chickens and sell to local trade in towns, but the poultry packer now handles the great bulk of the product.

The large towns, or those which are favorably situated, maintain one or more poultry-killing establishments. These may vary from a simple shed, where the chickens are picked and packed in barrels, to the modern poultry-packing establishment, with its accommodations for fattening, dressing, packing, freezing, and storing. The poultry-buying stations may be branches of the larger packing establishments, or may be branch houses of large produce firms, or they may be small firms operating independently and selling in the open market.

A detailed account of the poultry-packing industry is not within the scope of this bulletin, but the following information is given in order that the farmer can understand why fowls of certain quality are wanted by the packer.

The chickens as purchased are grouped into the following classes: Springs, hens, old roosters and (at certain seasons) young roosters or staggy cockerels. Early in the season small



Dressed poultry room of a modern poultry packing establishment.

springers are quoted as broilers, while capons form a separate item when such are grown.

Chickens are starved before killing for the purpose of emptying the crop, and, to some degree, the intestines. If this is not done the carcass presents an unsightly appearance and spoils more readily in storage. In Kansas, as well as in some other states, the law requires poultry to be drawn. This is advisable only when the drawing can be accomplished with great care. The method of picking is not always the same, even in the same plant. Scalding is frequently used for local trade, in the summer season, or with cheap-grade stuff. The greater portion of the stock is picked dry. The pickers are generally paid so much per bird. In some plants men do the roughing while girls are employed as pinners. Pickers work either with the chickens suspended by a cord or fastened upon a bench adapted to this purpose. The killing is done by bleeding and sticking. The last thrust reaches the brain and paralyzes the bird. The manner of making these cuts must be learned by practical instruction. The feathers are saved, and amount to a considerable item. White feathers are worth more than others. The head and feet are left on the chicken and the entrails are not always removed.

The bird, after being chilled in ice-water or in the cooling room, is ready for grading and packing. This, from the producer's standpoint, is the most interesting stage in the process, for it is here that the quality of the stock is to be observed. The grading is made on three considerations: (1) The general division of cocks, springs, hens and capons is kept separate from the killing-room; (2) the grading for quality; (3) the assortment according to size.

The grading for quality depends on the general shape of the chicken, the plumpness or covering of meat, the neatness of picking, the color of skin and legs, and the appearance of the feet and head, which latter points indicate the age and condition of health. The culls consist of deformed and scrawny chickens. The seconds are poor in flesh, or they may be, in the case of hens, unsightly from overfatness. They are packed in barrels and go to the cheapest trade. Those carcasses slightly bruised or torn in dressing also go in this class. Although a preference is generally stated for yellow-skinned poultry, the white-skinned birds, if equal in other points, are not underranked in this score. The skin color that is decidedly objectionable is a purplish tinge, which is a sign of diseased stock. Black pin-feathers and dark-colored legs are a source of objection. Especially is this true with young birds which show the pin-feathers. Feathered legs are slightly more objectionable than smooth legs. Small combs and the absence of spurs give better appearance to the carcass.

The assortment according to size goes by half-pound gradations. The common sizes for hens run 3, 3½, 4, 4½ and 5 pounds or more, which gives a weight of 36 to 60 pounds for boxes containing one dozen each. Hens are packed in double-layer boxes, with the heads and feet in the center, so that when the boxes are opened from either side the carcasses are neatly presented to view. Young chickens are culled and graded in a manner similar to hens. The sizes commonly range from 18 to 54 pounds per box of one dozen. The springs are usually packed in single-layer boxes which, when properly opened, expose the back of the chicken to view. The sizes designated as broilers are 1½ to 2½ pounds, fryers 3 to 39 pounds, roasters 4 pounds and upwards. Staggy cockerels form a class by themselves.

After packing, chickens may be shipped to market imme-

diately, or they may be frozen and stored. Shipments of any importance are made in refrigerator-cars.

THE CRATE-FED CHICKEN INDUSTRY.

The crate-fed chicken industry is a new development of the Kansas poultry business. The growth of this industry has been so rapid and the interest in this work so great that it deserves consideration.

The fattening of live stock by confinement in limited space is an old idea. This method of fattening poultry is, in France and England, a time-honored custom. Within the last ten or fifteen years it has been introduced to some extent in our Eastern states and in Canada. The introduction of crate-fattening into Kansas territory has occurred in the last six years, and the credit for this innovation belongs to the packing firms. At the present time the business is not confined to the packing establishments of the Missouri river cities, but is shared by independent plants throughout the state.

The plants of the state range from a few hundred to as high as 14,000 crates capacity. They are constructed for convenience and a saving of labor, and in this respect are decidedly in advance of the old establishments in localities where fattening has been long practiced. The room used for fattening is well built and sanitary. A good system of ventilation is essential. The coops are built back to back and two or more coops in height. Each coop is high and wide enough to comfortably accommodate the chickens, and long enough to contain from five to twelve chickens. The chickens stand on slats, beneath which are dropping-boards that may be drawn out for cleaning. The dropping-boards and feeding-troughs are often made of metal. Strict cleanliness is enforced. No droppings or feed are allowed to accumulate and decompose.

Stock Used for Fattening.

As is a general rule in meat production, young animals give much better returns for food consumed than do mature individuals. With the young chicken the weight is added as flesh, while the hen has a tendency, which increases with age, to turn the same food into useless fat. For this reason the general practice is to fatten only the best of the young chickens. The head feeder at a large and successful poultry plant in south central Kansas gave the following information on the selection of birds for the fattening crates :

“The younger the stock the more profitable the gain. All specimens showing the slightest indication of disease are discarded. The Plymouth Rock is the favorite breed, and the Wyandotte is second. Leghorns are comparatively fat when received, and, while they do well under feed and ‘yellow up’ nicely, they do not gain as much as the American breeds. Black chickens are not fed at all. Brahmas and Cochins are not considered good feeders at the age when they are commonly sold. Chickens in fair flesh at the start make better gains than those that are extremely lean or very fat. But, contrary to what the amateur might assume, the moderately fat chicken will continue to make fair gains while the very lean chicken seldom returns a profit.”

System of Feeding.

The idea has been somewhat prevalent that there is some guarded secret about the rations used in crate-fattening. This is a mistaken notion. The rations used contain no new or wonderful constituent, and although individual feeders may have their own formulas, the general composition of the feed is common knowledge. The feed most commonly used consists of finely ground grain, mixed to a batter with buttermilk or sour skim-milk. The favorite grain for the purpose is oats finely ground and the hulls removed. Oats may be used as the sole grain, and is the only grain recommended as suitable to be fed alone. Corn is used, but not by itself. Shorts, ground barley or ground buckwheat are sometimes used. Beans, peas, linseed and gluten meals may be used in small quantities. When milk products are obtainable they are a great aid to successful fattening. Tallow is often used in small quantities toward the finish of the feeding period. The assumption is that it causes the deposit of fat-globules throughout the muscular tissues, thus adding to the quality of the meat. The following simple rations show that there is nothing complex about the crate-fed chicken’s bill of fare :

- | | |
|------------------------------|-------------------------|
| No. 1.—Ground oats, 2 parts. | } Mixed with skim-milk. |
| Ground barley, 1 part. | |
| Ground corn, 1 part. | |
| No. 2.—Ground oats, 4 parts. | } Mixed with skim-milk. |
| Ground peas, 1 part. | |
| Ground corn, 1 part. | |
| Meat-meal, 1 part. | |

A ration used by some Kansas fatters with great success is composed of oatmeal and buttermilk.

The feed is given as a soft batter and is left in the troughs for about thirty minutes, when the residue is removed. Chickens are generally fed three times per day. Water may or may not be given, according to the weather and the amount of liquid used in the food.

The Finished Product.

The chicken that has been crate-fattened has practically the same amount of skeleton and offal as the unfattened specimen, but carries one or two pounds more of edible meat upon its carcass. Not only is the weight of the chicken and amount of edible meat increased, but the quality of the meat is greatly improved, consisting of juicy, tender flesh. For this reason the crate-feeding process is often spoken of as fleshing rather than as fattening.

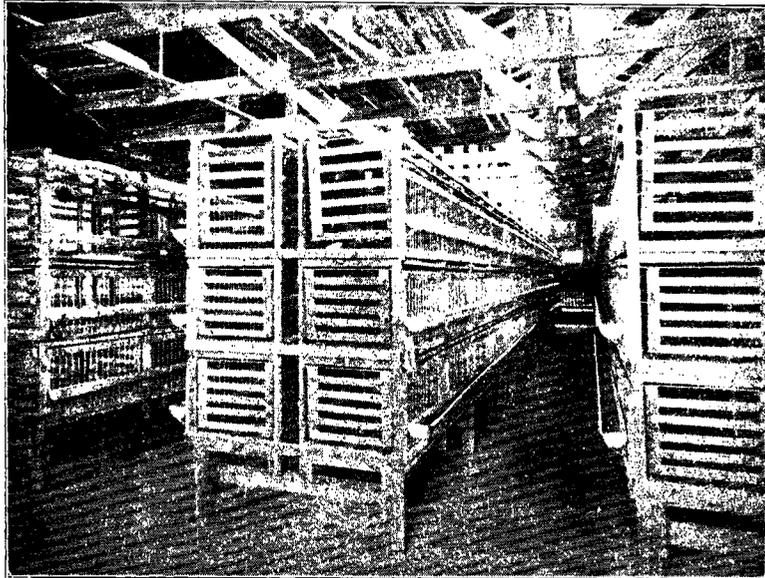
The enforced idleness causes the muscular tissue to become tender and filled with stored nutriment. The fatness of a young chicken, crate-fed on buttermilk and oatmeal, is a radically different thing from the fatness of an old hen that has been ranging around the corn-crib. The latter consists of a system of tough muscle, to which is attached, in the abdominal region, great masses of oily fat, undesirable as food.

Crate-feeding on the Farm.

Under present conditions in Kansas it seems likely that crate-fattening will continue to be conducted by those who make it a specialty rather than by individual farmers. Some of the reasons for this are as follows:

1. In Kansas climate successful feeding cannot be conducted out of doors. The farmer who would construct permanent buildings and coops to fatten his own crop of chickens needs to invest too much capital for the profits obtained.
2. The local trade for prime quality of poultry products is very limited, and at present no difference for quality is made in the prices packers pay for farmers' chickens.
3. The farmers would lack the experience of the professional fatterer; nor would they have the killing and storing facilities at hand, and crate-fed chickens deteriorate rapidly when shipped by crude methods.

Good results in fattening can be obtained by farmers, without the use of crates, by feeding a feed of two parts corn and



Fattening pens of a modern poultry packing establishment.

one part shorts. Two or three weeks of such feeding will pay a handsome profit, and can be done in the early fall when farm work is not crowding.

Crate-feeding requires most careful and skilled management. If all the chickens to be fed were of uniformly good stock and of perfect health, crate-feeding would be a simple matter of manual labor and favorable weather conditions. But chickens as received at the plant vary greatly in quality and health. Strict culling is necessary, and keen supervision of the feeding-room is required to detect and check outbreaks of disease. Success in fattening requires both skill in the feeding-room and knowledge of the stock of the community, while even the best of feeders at times have poor results, due to epidemics of disease and bad weather conditions.

FOREIGN METHODS OF MARKETING CHICKENS.

In European countries generally, and especially in France and England, great pains is taken in the production of market poultry. Each farmer and each neighborhood become known in the market for the quality of their poultry, and the prices they receive vary accordingly. In these countries more poultry is fattened and dressed by the growers than in loca-

tions where the market is distant. Near the cities of eastern United States conditions similar to those of England are found, and individual farmers are known by the particular quality of their produce.

In countries that have an export trade different systems have originated. In Denmark and Ireland cooperative societies are organized to handle perishable farm products. These, however, deal more with eggs than with poultry. In portions of England the fattening is done by private fatteners. The country being thickly settled, the chickens are collected directly from the farms by wagons making regular trips. This allows the rejection of the poor and immature specimens, whereas a premium may be paid on better stock. In Canada a fattening industry has grown up similar to the industry in Kansas, but in Canada the individual farmers, due largely to the efforts of the government, take greater interest in the production of poultry especially suited to the fattening industry, and the result is that Canadian poultry is rapidly growing in favor in the British market.

THE EVIL OF A UNIFORM PRICE.

The greatest fault of the Kansas poultry business as conducted at the present time is the evil of a uniform buying-price. After chickens are dressed the difference of quality is readily discerned, and the price varies from fancy quotations to almost nothing for culls. The packer pays a given rate per pound for live hens or for spring chickens. This price is paid alike for the best poultry received or for the scrawniest chickens that can be coaxed to stand up and be weighed. The price paid is the average worth of all chickens purchased at that market. All farmers who market an article better than the average are unjust losers, while those who sell inferior stock receive unearned profits. The producer of good stock receives pay for the extra quantity of his chickens, but for the extra quality no recognition whatever is given. To the deserving producer, if quality was recognized, it would result in a greatly increased stimulation of the production of good poultry. Any packer, if questioned, will state that he would be willing to grade chickens and pay for them according to quality, but that he does not do so because his competitor would pay a uniform price and drive him out of business. The man who receives an increased price would say little of

it, while the man who sells poor chickens, if he failed to receive the full amount to which he is accustomed, would think himself unjustly treated and use his influence against the dealer. A recognition of quality in buying is for the interest of both the farmer and the poultry dealer, and a mutual effort on the part of those interested to put in practice this reform would result in a great improvement of the poultry industry of the state.

CAPONIZING.

Caponizing is the castration of male chickens. Capons hold the same place in the poultry market as do steers in the beef market.

Caponizing is practiced to quite an extent in France, and to a less degree in England and the United States. Caponizing in Kansas has been practiced to a limited degree only. Only a few reports as to results are available. These, while they do not give any very great profits, indicate that with proper care and attention caponizing would be profitable for Kansas poultry-growers.

Capons should be operated upon when they are about ten weeks or three months old and weigh about two pounds. The purpose of caponizing is not, as is sometimes stated, to increase the size of the chicken, but to improve the quality of the meat.

The breeds suitable for caponizing are the Asiatics and Americans. Brahmas will produce, with proper care and sufficient time, the largest and finest capons. On the ordinary farm, where the capons would be allowed to run loose, it is probable that the Plymouth Rocks would prove more profitable. Plymouth Rocks, Brahmas, Langshans, Wyandottes, Indian Games, may all be used for capons. Leghorns and similar breeds are not to be considered for this purpose.

The operation of caponizing is performed by cutting in between the last two ribs. Both testicles may be removed from one side or both sides may be opened. The cockerel should be starved for twenty-four hours in order to empty the intestines. Asiatics are more difficult to operate on than Americans, the testicles being larger and less firm. There is always some danger of causing death by tearing blood vessels, but the per cent. of loss with an experienced operator is very small. Loss by inflammation is still more rare. The testicle of a bird is not as highly developed as in a mammal, and if the organ is

broken and a small fragment remains attached it will produce birds known as slips. Some growers advise looking over the capons and puncturing the wind puffs that gather beneath the skin. This, however, is not necessary. It is preferable to feed soft feeds for a few days following the operation.

The feeding of capons differs little from the feeding of other growing chickens. Corn, wheat, barley and Kafir-corn would be suitable grain, while casein or beef-scrap would be necessary to produce the best growth. They can be confined in greater numbers than other chickens, as they are not restless and quarrelsome.

The price received for capons is greater than any other kind of poultry meat except early broilers. There may be trouble in some localities in getting dealers to recognize capons as such and pay an advanced price.

It is to be expected that the amount of caponizing done in this state will gradually increase. Those wishing to try the growing of capons will do well to secure an experienced operator. Good men at this work receive five cents per bird. Poor operators are dear at any price, as they produce a large number of worthless slips.

FEEDING LAYING HENS.

Foods for Egg Production.

The food requirements of a laying hen are very like those required by a growing chicken. The production of eggs requires material similar to that required to produce flesh. One addition to the list is, however, required for egg production, which is lime, of which the shell of the egg is formed. In the summer-time hens on the range will find sufficient lime to supply their needs. Yarded or shut-in chickens should be supplied with more lime than the food contains. Crushed oyster-shell is now sold for this purpose, and answers the purpose admirably.

A supply of green food is one of the requisites of successful winter feeding. Vegetables and refuse from the kitchen help out in this matter, but seldom furnish a sufficient supply of this kind. Vegetables are sometimes especially grown for this purpose. Mangels and sugar-beets are excellent. Cabbage, potatoes and turnips answer the purpose fairly well. Mangels are fed by splitting in halves and sticking to nails driven in the wall. Clover and alfalfa are excellent chicken feeds and

should be more extensively used by farmers in winter feeding. The leaves that shatter off in the mow are the choicest portion for chicken feeding, and are best fed by scalding with hot water and mixing in a mash.

Almost all grains are suitable foods for hens. Corn, on account of its cheapness and general distribution, has been more widely used than any other grain for feeding chickens. Many people, having found out that an addition of other kinds of food to a corn diet results in a better egg yield, have concluded that corn is not a good egg-making food. This conclusion is a mistake ; and, while experiments have shown that a diet of mixed foods is superior to a diet composed chiefly of corn, it has also been found by repeated experiments if hens are supplied with green foods, as alfalfa, with mineral matter, some form of milk or meat food, and are forced to take sufficient amount of exercise, the danger from overfatness due to the feeding of a reasonable amount of corn need not be feared.

As has already been emphasized, the variety of food given is more essential than the kind. Do not feed one grain all the time. The more variety fed the better. Corn and Kafir-corn, being cheap grains, will perhaps form the major portion of the ration, but, even if much higher in price, it will pay to add a portion of such grains as wheat, barley, oats or buckwheat. Where a mash is fed, corn-meal, shorts and bran, because least expensive, should form the bulk of the mash. Other meals that can be added in smaller amounts are linseed-meal, pea-meal, soy-bean and cottonseed-meal.

A feeding experiment with six pens of White Leghorns was conducted at the Kansas Experiment Station, beginning February 1, 1906, and ending February 1, 1907. The object of this experiment was to determine the necessity of feeding some proteinous feed, such as casein and beef-scrap, in connection with the carbonous feeds, such as corn and Kafir-corn, for egg-laying. The results of the experiments are as follows :

A TWELVE-MONTHS FEEDING EXPERIMENT WITH SIX PENS OF WHITE LEGHORNS, CONDUCTED AT THE KANSAS STATE AGRICULTURAL COLLEGE FROM FEBRUARY 1, 1906, TO FEBRUARY 1, 1907.

Pen	FEED.		FIRST SIX MONTHS.								SECOND SIX MONTHS.							
			Feb.	Mar.	Apr.	May	Jun.	Jul.	Total.	Per hen.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Yearly total.	Per hen.
No. 1. 22 hens.	Beef- scrap, corn.	Eggs.....	154	277	341	340	396	412	1,920	87.2	309	127	16	6	7	12	2,397	114
		Feed.....	\$0.60	\$0.66	\$1.10	\$1.02	\$0.92	\$1.05	\$5.35	.....	\$1.62	\$0.99	\$1.02	\$1.10	\$1.41	\$1.34	\$12.63	\$0.61
		Profit or loss..	.94	2.11	2.31	2.38	3.04	3.07	13.85	\$0.594	1.47	.56	.84	.98	1.25	1.16	11.65	.544
No. 2. 20 hens.	Casein, corn.	Eggs.....	151	236	335	301	298	233	1,554	77.7	202	114	74	14	16	44	2,018	98.4
		Feed.....	\$0.50	\$0.57	\$1.20	\$1.08	\$1.27	\$0.87	\$5.49	.....	\$1.18	\$1.07	\$1.20	\$1.50	\$1.20	\$0.86	\$12.50	\$0.60
		Profit or loss..	1.01	1.79	2.15	1.93	1.71	1.46	10.05	\$0.443	.74	.25	.10	.82	.88	.20	9.04	.406
No. 3. 17 hens.	Casein, corn chop, wheat, corn.	Eggs.....	145	207	312	314	254	298	1,530	90	284	160	39	13	9	25	2,060	125
		Feed.....	\$0.60	\$0.67	\$1.15	\$1.64	\$1.26	\$1.71	\$7.03	.....	\$1.10	\$1.01	\$0.85	\$0.72	\$0.72	\$0.83	\$12.26	\$0.74
		Profit or loss..	.85	1.40	1.97	1.50	1.46	2.13	9.31	\$0.584	1.74	.94	.13	.46	.54	.46	10.40	.63
No. 4. 10 hens.	Wheat, corn.	Eggs.....	110	60	91	57	113	78	509	51	71	20	2	2	18	23	645	648
		Feed.....	\$0.60	\$0.47	\$0.60	\$0.55	\$0.39	\$0.35	\$2.96	.....	\$0.24	\$0.32	\$0.38	\$0.57	\$0.48	\$0.33	\$5.28	\$0.528
		Profit or loss..	.50	.13	.31	.02	.74	.43	2.13	\$0.25	.47	.07	.35	.53	.09	.01	1.57	.157
No. 5. 10 hens.	Millet, corn.	Eggs.....	55	83	80	98	95	124	535	53.5	76	10	.....	.....	10	15	646	65.3
		Feed.....	\$0.30	\$0.37	\$0.80	\$0.82	\$0.55	\$0.58	\$3.42	.....	\$0.71	\$0.76	\$0.52	\$0.53	\$0.47	\$0.33	\$6.74	\$0.56
		Profit or loss..	.25	.46	.00	.16	.40	.66	1.93	\$0.193	.05	.64	.52	.53	.25	.12	8.00	.23
No. 6. 5 hens.	Beef- scrap, Kafir.	Eggs.....	32	52	63	54	76	80	357	71.4	49	25	17	1	5	13	367	93
		Feed.....	\$0.11	\$0.14	\$0.28	\$0.25	\$0.45	\$0.20	\$1.43	.....	\$0.23	\$0.28	\$0.35	\$0.49	\$0.34	\$0.38	\$3.45	\$0.69
		Profit or loss..	.21	.38	.35	.29	.31	.40	1.94	\$0.39	.57	.38	.10	.47	.22	.20	1.14	.23

COST IN POUNDS AND COST OF FEED PER MONTH.

PEN No. 1.

FEED.	Feb.		Mar.		Apr.		May.		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Jan.	
	lbs.	cts.																						
Corn	60	30	52	26	92	46	100	50	90	45	50	50	69	69	60	60	60	45	60	40	60	45	60	42
Grit			4	04	4	4	10	10	2	02	4	04	3	03	3	02	2	02			1	01	1	01
Beef-scrap	10	30	12	36	20	60	14	42	15	45	17	51	30	90	12	36	26	65	28	70	38	95	36	90

PEN No. 2.

Casein	8	23	8	24	23	69	9	27	32	95	18	54	22	66	18	54	25	75	22	68	38	74	14	42
Corn	50	25	60	30	90	45	144	72	54	27	30	30	50	50	60	60	60	43	60	40	60	45	60	40
Grit	2	02	3	03	6	06	9	09	5	05	3	03	2	02	3	03	2	02	2	02	1	01	1	01
Alfalfa																							3	01

PEN No. 3.

Chop	16	12	16	12	20	15	52	40	40	24	9	09	35	40	33	33	29	22	22	20	24	23	21	14
Wheat	6	06	6	06	25	20	35	35	20	25	29	30	21	10	21	21	15	15	11	11	8	08	19	20
Casein	4	12	4	12	5	15	20	60	12	36	9	22	12	36	11	33	10½	26	10	25	11	33		
Corn	50	25	64	32	128	64	38	19	36	18	20	20	20	20	10	10	20	15	20	15	20	15	20	14
Grit	5	05	5	05	1	01	10	10	4	04	4	04	4	04	1	01					1	01	1	01

PEN No. 4.

Wheat	30	30	30	30	40	40	28	28	24	29	26	28	26	13	22	22	30	30	50	50	40	40	24	24
Corn	56	28	32	16	40	20	44	22	10	05	6	06	10	10	10	10	10	08	10	07	10	07	10	07
Grit	2	02	1	01			5	05	5	05	1	01	1	01					1	01	1	01	1	01

PEN No. 5.

Millet	14	20	30	45	40	60	37	55	29	43	32	45	39	60	35	52	46	46	46	46	31	31	24	24
Corn	20	10	20	10	40	20	44	22	18	09	10	10	10	10	23	23	10	06	10	07	20	15	10	07
Grit			2	02			5	05	3	03	3	03	1	01	1	01					1	01	1	01

PEN No. 6.

Beef-scrap	2	06	3	09	8	24	7½	23	9	27	1	03	1	03	1	03	8	20	4	10	6	15	8	20
Kafir	6	06	7	07	10	10	5	05	25	25	20	20	20	20	20	20	15	15	39	39	18	18	18	18
Grit	1	01	1	01	1	01	5	05	2	02										1	01	1	01	01

COST OF FEED IN COMPUTING DATA.
 FEED PER HUNDRED-WEIGHT.

FEED.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.
Chop.....	\$0.60	\$0.60	\$0.60	\$0.60	\$0.60	\$1.00	\$1.14	\$1.00	\$0.75	\$0.98	\$0.98	\$0.98
Wheat.....	1.00	1.00	1.00	1.00	1.25	1.25	.48	1.00	1.00	1.00	1.00	1.00
Casein.....	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	2.50	2.50	2.50
Corn.....	.50	.50	.50	.50	.50	.50	1.00	1.00	.75	.66	.75	.75
Grit.....	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Millet.....	1.50	1.50	1.50	1.50	1.48	1.48	1.48	1.48	1.00	1.00	1.00	1.00
Beef-scrap.....	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	2.50	2.50	2.50
Kafir.....	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

From the above experiments we note the great importance of feeding feeds that are rich in protein, like casein and beef-scrap, in connection with corn. Casein has been fed at the Station for a number of years with good results and has proved to be the best proteinous feed in this experiment for egg laying.

This experiment has brought out a new feature for creamery operators, in that they can make use of their by-products, such as buttermilk and skim-milk, which have up to the present day been a loss and a source of annoyance. The casein made from buttermilk has not been found fit to be used for industrial purposes, owing to the fact that during the process of the souring of cream the physical condition of the casein was changed, which, however, makes it a suitable feed for poultry. Buttermilk can be utilized in this way and made a source of profit for the creamery operator as well as for the poultryman.

Methods of Feeding.

There is a knack in feeding hens that must be learned by experience. The hens must be well fed and yet should always be a little hungry. During the day they are not to be at any time satisfied, but in the evening they may be fed all they will clean up in half an hour. It is a long-established custom with poultrymen to feed hens a wet mash food once a day. This may be fed in the morning or in the evening, according to convenience. At the Kansas Station evening feeding is preferred. Where meat and green food are well provided the mash can be dropped out of the bill of fare entirely and its place supplied by a greater variety of grain food. The method of feeding grain usually suggested for winter practice is to feed in straw or other litter. A place to scratch not only provides the much-needed exercise, but keeps the hens contented, warm and healthy. The finer the grain, the more often the

feeding, and the deeper the litter, the greater will be the exercise the hen must take in finding her daily allowance of food. Large breeds and old hens must be forced to exercise more vigorously than smaller hens or pullets. Examine the hens, and, if they are excessively fat, enforce more exercise. Leg-horns are by nature active and restless and will take plenty of exercise if given half a chance. Comfort and freedom from disturbance of any sort are essential to the best results with laying hens.

EGGS FOR MARKET.

Of the eggs produced in Kansas, probably about forty per cent. are consumed in the state. The remainder go chiefly to the large cities in the East. The handling of this product is a vast business and one in which many improvements have recently been made. Chief among these is the cold-storage system.

Cold Storage.

The supply of eggs ranges widely from month to month, the heavy season of production centering about April and the lightest run being in November. The cold-storage men begin storing eggs in March or April and continue to store heavily until June, after which time the quality deteriorates and does not keep well in storage. This storage stock begins to move out in September and should be cleaned up by December. Great loss may result if storage eggs are held too long.

The effect of the storage business is to even up the prices for the year. The reduction of the exceedingly high winter prices is unfortunate for those who are skilled enough to produce many eggs at that season of the year, but on a whole the storage business adds to the wealth-producing powers of the hen, for it serves to increase the annual consumption of eggs and prevents eggs from becoming a drug on the market during the season of heavy production.

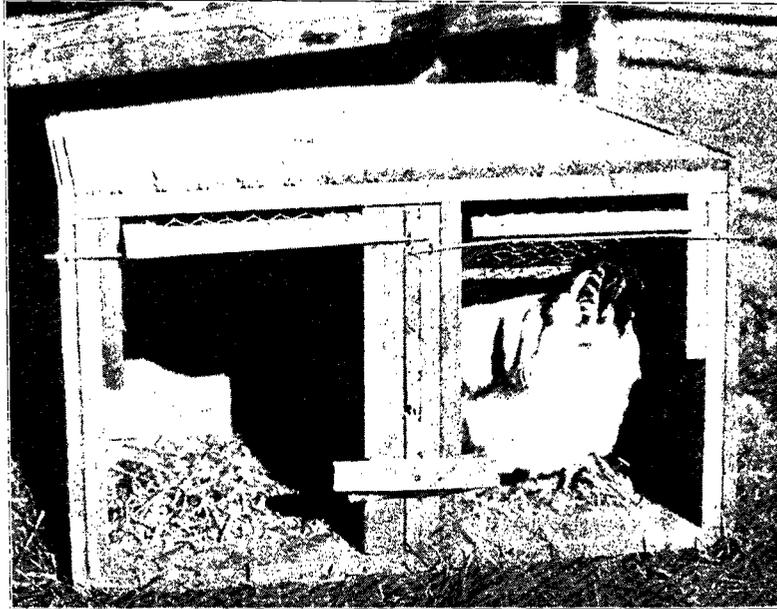
Storage plants are generally located in large cities. They are cooled by mechanical refrigeration. A free circulation of fresh air and freedom from odors are essential to the successful storing of eggs. A temperature at or below the freezing point is maintained, although forty degrees is considered sufficiently low for temporary storage. The shell of an egg acts as only a partial protection for the contents. Outside filth and germs of decay enter through the pores of the shell and cause the egg to rot. These bacteria are not killed by the cooling of

the storage-room, but their activity is checked. If an egg is on the verge of spoiling when placed in storage the decay will proceed slowly and the egg when taken out will be unfit for use. The storage egg, under the most favorable circumstances, is not equal to a fresh egg, for slow processes of change have proceeded during the period of storage. Good storage eggs, if consumed quickly after removal from the coolers, are wholesome, and may indeed be better in the fall season than eggs direct from the farm. March and April eggs are, in spite of a long period of storage, the best quality of storage stock. This is accounted for by the fact that owing to cooler weather and rising price eggs leave the farm in the best condition at this season of the year.

Many eggs that would not do for ordinary storage are preserved by direct freezing. These eggs are broken and carefully sorted and placed in large cans and are then frozen. Such a product is disposed of to bakers, confectioners and others desiring eggs in large quantities. Another method of preserving eggs is by evaporation. Evaporated or dried egg is, weight considered, about the most nourishing food product known. The chief value of such an article lies in provisioning inaccessible regions. There is no reason, however, why this product should not become a common article of diet during the season of high prices of eggs. Dried eggs can be eaten as custards, omelets, or similar dishes.

Shipping of Eggs.

In the preservation, transportation and disposal of our products, no more modern methods are used anywhere in the world than in the United States. But in the system, or rather lack of system, by which eggs get into the hands of the shipper or cold-storage man the American system is decidedly deficient; an investigation showing the rank of Kansas eggs in the New York market to be several cents below that of the near-by product. If eggs are fresh when they leave Kansas the deterioration during shipment should be but slight. With a proper method of collecting and paying for eggs the stale eggs can be forced out of the trade. Freshly gathered and promptly shipped Kansas eggs would sell on the New York market at a figure closely approaching that of the near-by products. Every cent added to the price of Kansas eggs means an addition of more than half a million dollars to the annual income of Kansas farmers.



The Maine Experiment Station trap-nest.

GRADING OF EGGS.

Within recent years the produce houses have introduced a system of grading eggs, in which they agree to pay a higher price for fresh, clean eggs, known as the first grade, than for eggs which are dirty and which have been kept at a warm temperature for a considerable length of time, and which are classed as second grade. The age and condition of the egg is determined by means of the egg-tester, which indicates a dark spot in the center of the egg when held to a light. However, if eggs are kept at a cold temperature this dark spot will not develop so rapidly. Cleanliness of the eggs is another important factor. When eggs become dirty they become infected with bacteria, which soon enter the pores of the shell and infect the contents of the egg. It has been the experience of the people in general in storing eggs that soiled eggs will not keep as well as good, clean eggs; even though eggs have once been soiled and are washed and cleansed again, they will not have the keeping qualities, and hence it is very essential to provide the hen with a good, clean nest, to avoid the eggs becoming dirty. Eggs properly ought to be bought and sold according to the weight, rather than dozen, which is the custom of the

day; but, in order to overcome this difficulty, some states have passed laws to the effect that eggs sold upon the market should weigh a certain amount, commonly twenty-eight ounces per dozen. According to the grading system, all small eggs are put into the second class, for which the producer receives a smaller sum.

The difference between first- and second-grade eggs ranges from four to six cents, depending somewhat upon the condition of the market.

The interests of both dealer and producer are mutual in adopting a system to grade all eggs sold on the market, in justice to the producer of good eggs, who should be rewarded for his time and money spent, and in justice to the purchaser, who will be able to furnish the consumer good eggs at a reasonable price.

IMPROVING A FLOCK.

There are many ideas in regard to the breeding of animals, but the whole knowledge may be summarized with the advice to breed from good animals that have had good ancestors.

Breeding for Egg Production.

Attempts to improve the egg-producing qualities of the hen date to the domestication of the hen, but it has only been within the last few years that rapid progress has been possible in this work. The inability to determine the good layers has been the difficulty. With the perfection of the trap nest this difficulty has been removed and many poultry breeders are now engaged in the production of egg-laying strains of fowls. The improvement to be brought about by breeding from the best layers is not as rapid and certain as some enthusiastic breeders claim, but it is evident that only by this method can heavy egg production be made an inherited trait in a strain of chickens.

Determining the Layers.

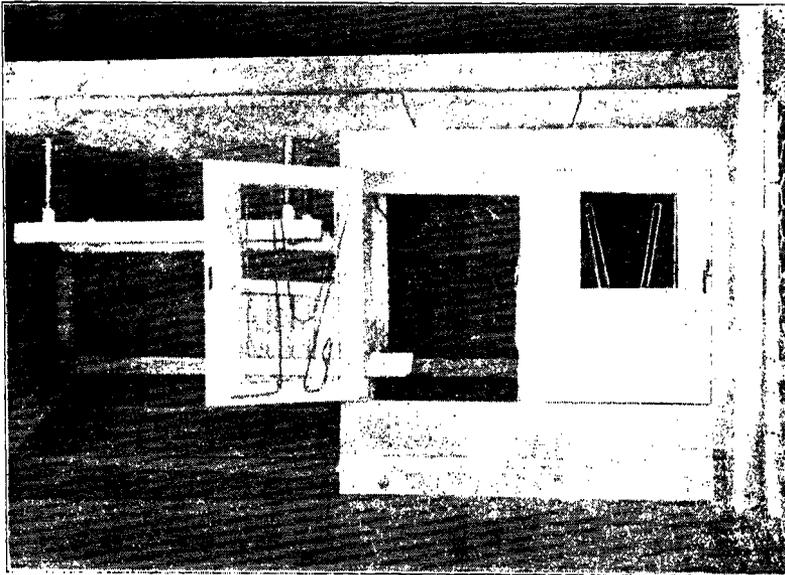
The great majority of people make no selection of hens from which to hatch their stock. The eggs of the whole flock are kept together and when eggs are desired for hatching they are selected from a general basket. It has been assumed, and is shown by trap-nest records, that eggs thus selected in the spring of the year are from the poorer rather than from the better layers. This is because hens that have not been laying during the winter will lay very heavily during the spring season.

Many breeders have attempted to pick out the good layers by the appearance of the hens. Before the advent of the trap nest the "egg type" of hen was believed to be a positive indication of a good layer. This "egg-type" hen had slender neck, small head, long, deep body of a wedge shape. Trap-nest records have shown the egg-type method of selection cannot always be depended upon. Other methods have been suggested by the study of the habits of the hen. The hen that sits upon the roost while other hens are out foraging is probably a drone. The excessively fat or the excessively lean hens are not likely to be layers. It would naturally be supposed that the active laying hen would be the last one to go to roost at night. At this Station observation was made upon the order in which hens went to roost, and the above assumption was found in the majority of cases to be correct. This scheme is perhaps as good as any of the suggested plans for picking out the laying hens, but at best all such methods are only approximations, and, while useful in the absence of accurate methods, are not to be relied upon.

Trap nests devised to catch the hen that lays the egg are numerous in the market. A trap nest to be successful must not only catch the hen that lays, but must prevent the entrance of the other hens. The more trap nests that are provided, the less often they will require attention, but the more often the nests are attended the better for the comfort of the hens.

A scheme that has been suggested in the place of trap nests is a system of small compartments, in each of which one hen is kept. Such a scheme does not seem feasible on a large scale, but for breeders wishing to keep the records of a small number of hens it is not impractical. A number of these nests and separate runs should, for the breeder who cannot devote himself during the day to the care of trap nests, be an improvement over guesswork.

Having determined the best layers it remains to breed from these and from their descendants. The tests of pullets hatched from hens are better signs of the hen's value as a breeder than is her own record. It has been surmised that a hen which lays heavily will not lay eggs containing vigorous germs. So far as the records at this Station indicate, the laying of infertile eggs is a family or individual trait not particularly related to the number of eggs laid.



Interior and exterior views of the Kansas Experiment Station trap-nest, also the roost and platform in the laying contest pens.

Whatever may be the change desired in a strain of chickens, specimens showing the trait to be selected should be used as breeders. Those characteristics readily visible to the eye have long been subjects of the breeders' efforts. But traits not directly visible can likewise be changed by breeding. The number of eggs, size and color of eggs, rapid growth, ready fattening powers, quality of meat and general characteristics, are all matters of inheritance, and if proper means are taken to select the desirable individuals all such characteristics can be changed at the will of the breeder.

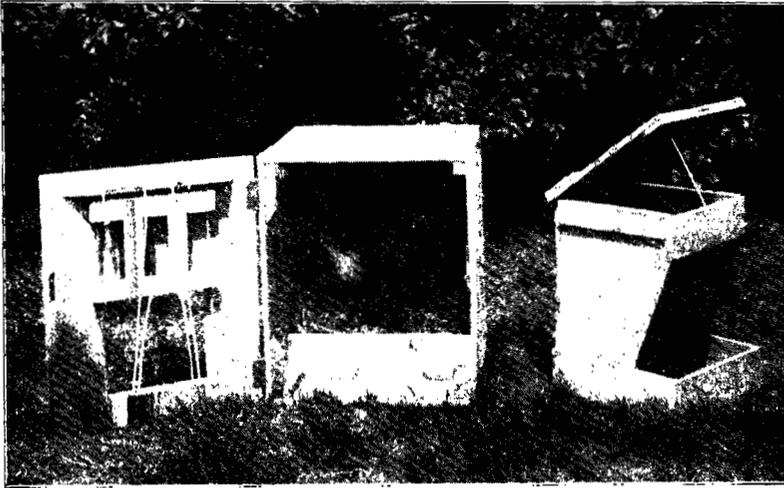
GENERAL CARE OF THE FLOCK.

On many farms few eggs are gathered from October to January. This is a season when eggs bring the best prices. To secure eggs at this season, the first requisite is that the pullets be hatched between the first of March and the middle of May, or, in the case of Leghorns, between the first of April and the first of June. Pullets hatched later than these dates are a source of expense during the fall and early winter. On the other hand, it is an unnecessary waste of effort to hatch pullets before the dates mentioned, because, if hatched too early, they will molt in the fall and stop laying the same as old

hens. Pullets must be well fed and cared for if expected to develop in the time allowed. As they begin to show signs of maturity the pullets should be gotten into permanent quarters. If allowed to begin laying while roosting in coops or in trees they will be liable to quit laying when changed to new quarters. If possible the coops should be gradually shoved toward the hen-house and the pullets gotten into quarters without excitement or confinement. The poultry-house at this season should have an ample circulation of fresh air, for young stock that have been roosting in open coops are liable to catch cold if confined in tight houses. A common mistake is to allow a large troop of young roosters to overrun the premises in the early fall. Not only is money lost in the decrease in price that can be obtained for these cockerels, but the pullets are greatly annoyed, to the detriment of the egg yield.

Selling Old Stock.

Any chicken that is not paying for its food in growth or in egg production is a source of loss. As soon as the hatching season is over old roosters should be sent to market. Through June and August egg production is not profitable, and a thorough culling of the hens should be made. Market all hens two years or more of age. Send with these all the yearling hens that appear fat and lazy. By the time the young pullets are ready to be moved into quarters—the latter part of August—these hens should be reduced to about one-half the original number. Some time during September a final culling of the old stock should be made. Those that have not yet begun to molt should be sold, as they will not be laying again before the warm days of the following February. This system of culling will leave the best portion of the yearling hens, which, together with the early-hatched pullets, will make a profitable flock of layers. Many farmers practice no intelligent culling of their chickens, but allow old hens, together with runty pullets and scrub cockerels, to consume the food and occupy the room that should be used for the workers of the flock. A smaller number of the best chickens will pay more profit than a house crowded full of everything raised. It has been repeatedly demonstrated that pullets are more profitable than older hens, but as yearling hens are considered better breeders and better sitters it is well to keep a few of them through their second winter. The pullets in permanent quarters should be



The yard at the Kansas Experiment Station, with a trap-nest and a feed-hopper.

well fed, and if they have been hatched at the proper season will begin laying during the fall months. As the weather turns cold and rains set in, the pullets should be confined in the houses and given careful treatment, for an outbreak of roup may result.

Producers of pure-bred poultry should exercise great caution in keeping their stock pure by not allowing cockerels to run with their hens too late a period before eggs are used for hatching purposes. Very little care is taken in this line on the farm where a farmer has more than one pure breed of poultry. To obtain some data from which we could draw conclusions a few experiments were conducted at the Kansas Station in the year of 1906, which were as follows: First, it was necessary to find how long a male will influence the offspring, and, second, to determine how long eggs would remain fertile after the male was removed.

In the first test a pen of White Leghorn hens was put with a Light Brahma male for one month. The Brahma was then removed and the hens left without a male for twenty days, when a White Rock cock was placed in the pen. Thirty days after the Brahma cock was removed sixteen eggs were set. After thirty-one days sixteen more were set, and at the end of thirty-three days another sixteen were set. The results of these tests were as follows: Five chickens of the first hatch

showed Brahma blood, one chick of the second hatch still showed Brahma blood, but there was no indication of such in the third hatch.

In the second experiment, seventeen Barred Rock eggs were set seventeen days after the male was removed. All proved to be infertile.

In the third experiment, fifty-four eggs were set fourteen days after the male was removed. Forty-eight proved to be infertile.

In a fourth test, White Wyandotte hens that had been for months without a male were mated with a Dorking cock, and on the eighth day eggs were saved for incubation, all of which proved to be infertile. On the fourteenth day fifteen eggs were set, six of which proved to be infertile.

The tests show that the male may influence the offspring for as long as thirty-two days, and that hens should be kept that length of time with the male or away from other males to be sure of the purity of breeding; that hens cannot be allowed to run promiscuously, then shut up for a few days, and the eggs prove satisfactory for hatching from a fancier's standpoint. We know that a great deal depends upon whether the hen is laying, or in a laying condition, at the time the test is made, but yet we could not consider it advisable to use a hen in the breeding-yard short of thirty days after she had been exposed to the influence of a male of different breed if we wished the offspring to be pure bred.

When hens become broody out of season it is best to take them from the nest and place them in a room where nests are not available. This may be in another building, or, if such is not convenient, in a coop.

Egg eating is a habit formed by hens, caused by poorly arranged nests which allow eggs to become broken. The eating of feathers from other chickens is another bad habit sometimes acquired by hens confined indoors. Better nests and something to keep the hens occupied are remedies for these troubles. Hens that have once acquired the habit should be sold.

Cleanliness.

The advice commonly given in poultry papers would require one to exercise nearly as much pains in the cleaning of a chicken-house as in the cleaning of a kitchen. Such advice may be suitable for the city poultry fanciers, but it is out of

place when given to the farmer. Poultry raising, the same as any other farm work, must pay for the labor put into it, and this will not be the case if attempt is made to follow all the suggestions of the theoretical poultry writer.

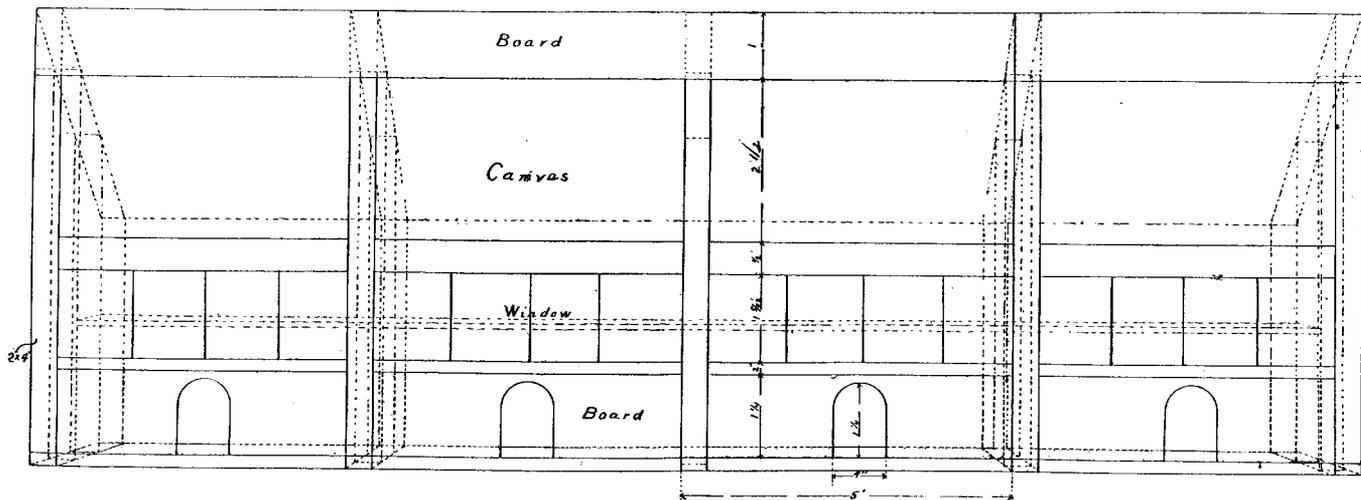
The ease with which the premises may be kept reasonably free from litter and filth is largely a matter of convenient arrangement. The handiest plan from this view-point is the colony system, In this the houses are moved to new locations as the ground becomes soiled. If the chicken-house is a stationary structure it should be built away from other buildings, scrap-piles, fence corners, etc., so that the ground can be frequently freshened by plowing and sowing in oats, rye or rape. The ground should be well sloped, so that the water draining from the surface may wash away much of the filth that on level ground would accumulate. Cleanliness indoors can be simplified by proper arrangement. First, the house must be dry. Poultry droppings, when dry, are not a source of danger if kept out of the feed. This may be accomplished by providing dropping-boards under the roosts. The droppings in the poultry-house should be removed often enough to prevent foul odors. It is best to clean it every day. Dry earth, gathered in the fall and stored in bins, is an excellent cleansing agent to use on the dropping-board of the chicken-house. Drinking vessels should be rinsed out when refilled and not allowed to accumulate a coat of slime. Feed-boards should be scraped off and dried in the sun. Sunshine is a cheap and efficient disinfectant.

DISEASES.

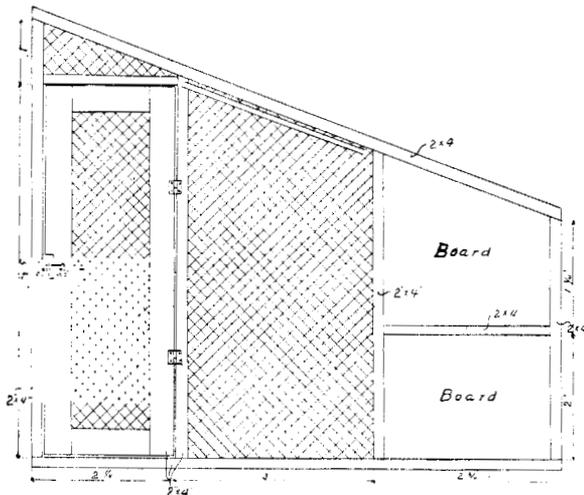
Many poultry books give innumerable diseases and lists of remedies concerning which the farm poultryman needs no knowledge whatever. There is very little definitely known on the subject of poultry diseases.

Poultry ailments are assignable to one of the three following causes, or a combination of these: First, hereditary or inborn weakness; second, unfavorable conditions of food, surroundings, etc.; third, germs or animal parasites.

A great many chickens die while yet within the shell, or during the growing process, there being no assignable reason save that of inherited weakness. To this class of troubles the only remedy is to breed from better stock. It is as much the trait of some birds to produce infertile eggs or chicks of low vitality as it is for others to produce vigorous offspring.



Front elevation of a practical poultry-house, such as is used at the Kansas Experiment Station.



Partition in the practical poultry-house.

The prevention of the second class of ailments has been discussed under the general head of "Feeding."

The third class of ailments belongs to the group of contagious diseases. It is now believed that most common diseases are caused by microscopic germs known as bacteria. These germs in some manner gain entrance to the body of an animal, and, growing within the tissues, give off poisonous substances known as toxins, which produce the symptoms of the disease. The ability to withstand disease germs varies with the particular animal and with the kind of disease. As a general rule it may be stated that disease germs cannot live in the body of a perfectly vigorous and healthy animal. It is only when the vitality is at a low ebb, owing to unfavorable conditions or inherited weakness, that disease germs enter the body and produce disease.

The bacteria which cause disease, like other living organisms, may be killed by poisoning. Such poisons are known as disinfectants. If it were possible to kill the bacteria within the animal, the curing of disease would be a simple matter, were it not for the fact that the common chemical poisons that kill germs kill the animal also. The only thing that can be relied on to kill disease germs within an animal is a counter-poison developed by the animal and known as anti-toxin. Such anti-toxins can be produced artificially and are used to combat certain diseases, as diphtheria and smallpox in human beings

and blackleg in cattle. Such a method of combating poultry diseases has not as yet been developed. The only available method of fighting contagious diseases of poultry is to destroy the disease germs before they enter the fowls and to remedy the causes which made the chicken susceptible to the disease.

Contagious diseases of poultry may be grouped into two general classes: First, those highly contagious; second, those contracted only by fowls that are in a weakened condition. To the first class belong the severe epidemics, of which chicken-cholera is the most representative.

Chicken-cholera.

True European fowl-cholera has been identified in this country. Other diseases similar in symptoms and effect are confused with this. As the treatment should be similar the identification of the diseases is not essential.

Yellow or greenish-colored droppings, listless attitude, refusal of food and great thirst are the more readily observed symptoms. The disease runs a rapid course, death resulting in about three days. The death rate is very high. The disease is spread by droppings and dead birds, and through feed and water. To stamp out the disease, kill and burn or bury all sick chickens, and disinfect the premises frequently and thoroughly. A spray made of one-half gallon carbolic acid, one-half gallon of phenol and twenty gallons of water may be used. Corrosive sublimate, 1 part in 2000 parts of water, should be used in the drinking water. This is not to cure sick birds, but to prevent the disease from spreading by means of the drinking vessels. Food should be given in troughs arranged so that the chickens could not infect the food with their feet. All this work must be done thoroughly, and even then considerable loss can be expected before the disease is stamped out. If cholera has a good start in a flock of chickens it will often be better to dispose of the entire flock than to combat the disease.

Roup.

This disease is a representative of that class of diseases which, while being caused by bacteria, can be considered more of a disease of conditions than of contagion. Roup may be caused by a number of different bacteria which are commonly found in the air and soil. When chickens catch cold these germs find lodgment in the nasal passages and roup ensues. The first symptoms of roup are those of an ordinary cold, but

as the disease progresses a cheesy secretion appears in the head and throat. A wheezing or rattling sound is often produced by the breathing. The face and eyes swell, and in severe cases the chicken becomes blind. The most certain way of identifying roup is a characteristic sickening odor. The disease may last a week or a year. Birds occasionally recover, but are generally useless after having had roup.

Sick birds should be removed and destroyed, but the time usually spent in doctoring sick birds and disinfecting houses can in this case be better employed in finding and remedying the cause of the disease. Such causes may be looked for as inherited weakness, exposures to drafts, dampness, or to a sudden change in temperature. Fall and winter are the seasons of roup, while it is poorly housed and poorly bred flocks that most commonly suffer from this disease. Flocks that have become thoroughly roup should be disposed of and more vigorous birds secured. The curtain-front house has proved to be the most practical scheme to reduce the extent of the disease.

Lice and Mites.

The parasites referred to as chicken-lice include many different species, but in habits they may be classed as body-lice and roost-mites. The first, or true bird-lice, live on the body of the chicken and eat the feathers and skin. The roost-mite is similar to a spider and differs in habits from the body-lice in that it sucks the blood of the chicken and does not remain on the body of the fowl except at night.

Lice. —Body-lice are to be found upon almost all chickens, as well as on many other kinds of birds. Their presence in small numbers on matured fowls is not a serious matter. When body-lice are abundant on sitting-hens they go from the hen to the newly hatched chickens and often cause the death of the chicks. The successful methods of destroying body-lice are three in number : (1) The provision of dust or earth wallows in which the active hens will get rid of lice. These dust baths should be especially provided for yarded chickens and during the winter. Dry earth can be stored for this purpose. Sitting-hens should have access to dust baths. (2) The second method by which body-lice may be destroyed is the use of insect-powder. The pyrethrum powder is considered the best for this purpose, but is expensive and difficult to procure in the pure state. Tobacco dust is also used. Insect-powder is applied by holding the hen by the feet and working the dust

thoroughly into the feathers, especially the fluff. The use of insect-powder should be confined to sitting-hens and fancy stock, as the cost and labor of applying is too great for use upon the common chicken. (3) The third method is suitable for young chickens, and consists of applying some oil and grease on the head and under the wings. Do not grease the chick all over. With vigorous chickens and correct management the natural dust bath is all that is needed to combat the lice.

Mites. —The roost-mite is probably the cause of more loss to farm poultry raisers than any other pest or disease. The great difficulty in destroying mites on many farms is that chickens are allowed to roost in too many places. If the chicken-house proper is the only building infected with mites the difficulty of destroying them is not great. Plainness in the interior furnishings of the chicken-house is also a great advantage when it comes to fighting mites. The mites in the daytime are to be found lodged in the cracks near the roosting-place of the chickens. They can be killed with various liquids, the best in point of cheapness being boiling water. Give the chicken-house a thorough cleaning and scald by throwing dippers of hot water in all places where the mites can find lodgment. Hot water destroys the eggs as well as the mites. Whitewash is a good remedy, as it buries both mites and eggs beneath a coating of lime from which they cannot emerge. A solution of carbolic acid in kerosene, at the rate of a pint of acid to a gallon of oil, is an effective lice-paint. Another substance much used for destroying insects or similar pests is carbon disulphid. This is a liquid which evaporates readily, the vapor destroying the insects or mites. Carbon disulphid or other fumigating agents are not effective in the average chicken-house because the house cannot be tightly closed. The liquid lice-killers on the market are generally very effective, killing the mites by contact, and also by vapor, as does carbon disulphid.

CHICKEN-HOUSES.

A representative of the Station, during the summer of 1905, made personal visits to over 100 farms located throughout the central and eastern portions of the state. Judging from these visits, the following conclusion was drawn: Four-fifths or more of the farmers have houses separated from other buildings for the accommodation of the farm poultry. The ma-



A poultry-house in which some Kansas poultry lives.

majority of the remaining farmers house their chickens in lean-to sheds or in stables and parts of other farm buildings. Some farmers provide no building whatever for their hens. Few farmers have yards connected with their hen-houses. A still smaller number, and generally those engaged in fancy-chicken breeding have partitioned houses and free ranges.

The typical farm chicken-house is of a shed type, and an average size of about ten by sixteen feet. It is sided by a single thickness of boards, which may be patent siding. The interior is for the most part occupied with the roosts, usually arranged in the form of a ladder. The nests are commonly open boxes, and may be set on the floor or nailed to the wall.

Requisites of a Good Chicken-house.

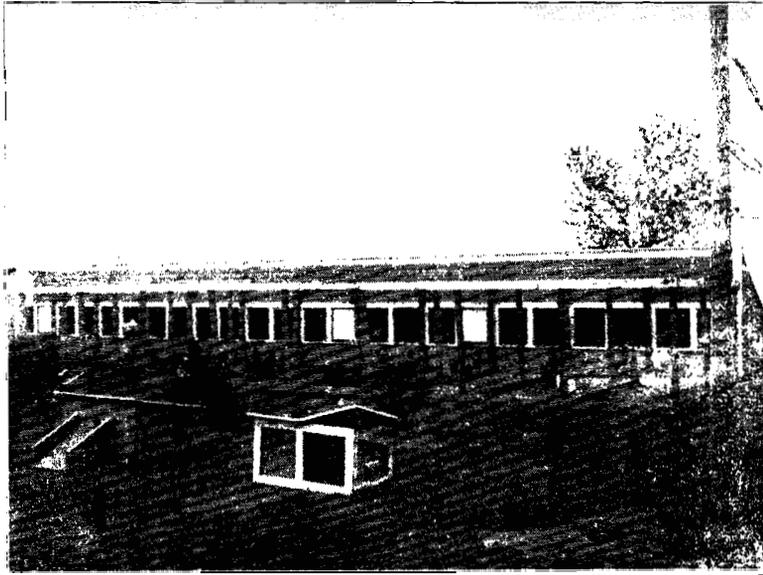
Many different styles of chicken-houses prove equally successful in the hands of poultrymen. It is unwise to recommend the universal adoption of any one form. If the following points are given careful study, any farmer should be able to build a successful chicken-house, suitable to his wants and purse.

Size and form —The house must be planned for the hens' comfort first, and then the owner may add such embellishments as may please his fancy. The hen needs, first of all, floor space, a place to eat and scratch. The more floor space the hen has the better, but the space above should not be too great, so as to maintain the proper temperature from the animal heat of the hens. All things considered, a house just high enough for a man to walk erectly and a floor space of about five square feet per hen would be advisable, depending somewhat whether the fowls are yarded.

Location. —Lands sloping to south or southeast, and that which dries quickly after a rain, will prove the most suitable for chickens. A gumbo patch should not be selected as a location for poultry. Hogs and hens should not occupy the same quarters, in fact, should be some distance apart, especially if heavy breeds of chickens are kept. Hens should be removed

from the garden, but may be near by or within an orchard. Chicken-houses should be separated from tool-sheds, stables, and other outbuildings.

Grading.—Grading for chicken-houses is not commonly practiced, but this is the easiest means of preventing dampness in the house, which is a serious handicap to successful poultry work. The ground-level may be raised with a plow and scraper, or the foundation of the house may be first built and before the frame is constructed filled with dirt.



A practical poultry-house, such as is used at the Kansas Experiment Station.

Foundations.—A stone foundation is best, but where stone is expensive may be replaced by cedar, hemlock or Osage orange posts, deeply set in the ground. Small houses can be built by setting tall posts in the ground and spiking both sills and plates directly to these posts. Colony houses are best built on runners, and these may be blocked up on stones after each removal of the house.

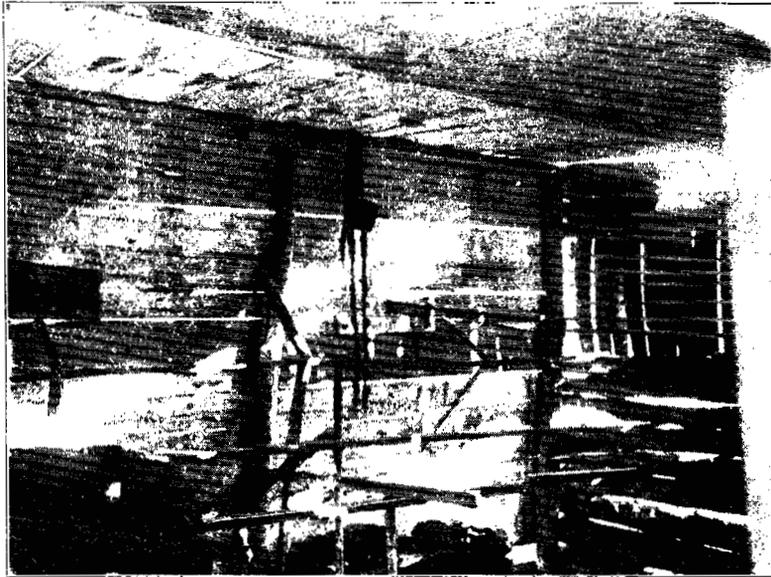
Floors.—Floors are commonly constructed of earth, boards or cement. Cement floors are perfectly sanitary and easy to keep clean. The objections to their common use is the first cost, of good cement floors. Cheaply constructed floors will not last. Board floors are very common and are preferred by

many poultrymen, but if close to the ground they harbor rats, while if open underneath they make the house cold. Covering wet ground by a board floor does not remedy the fault of dampness nearly so effectually as would a similar expenditure spent in raising the floor and surrounding ground by grading. All things considered, the dirt floor is the most suitable. This should be made by filling in above the outside ground-level. The drainage will be facilitated if the first layer of this floor be of cinders, small rocks or other coarse material. Above this layer should be placed a layer of clay, wet and packed hard, so the hens cannot scratch it up, or a different plan may be used and the floor constructed of a sandy or loamy soil of which the top layer can be renewed each year.

Walls.—The walls of a chicken-house must first of all be wind-tight. This may be attained in several ways. Upright boards with cracks battened is the cheapest method. Various kinds of lap-siding give similar results. The single-board wall may be greatly improved by lining with building-paper. This should be put on between the studding and siding. Lath may in addition be used to prevent the paper bagging out from the wall. The double-board wall is by far the best where a warm house is desired. It may be constructed with or without an air-space. The idea of a dead-air space is excellent, provided both walls are perfectly tight. The space between the studding in double walls is sometimes filled with some material such as shavings, sawdust or prairie hay. A wall more readily constructed and practically as efficient is made by siding up outside the studding with cheap lumber. On this is placed a layer of roofing paper. The double-walled house will pay for itself in exposed locations, and especially if Leg-horns or similar breeds are to be kept. For Kansas farms a shed-roof house, with the lower north side double-boarded and the south side of a single thickness, should prove a compromise between excessive cost and excessive cold. The windows of a chicken-house should furnish sufficient light that the hens may find grain in the litter on cloudy days. Too much glass in a poultry-house makes the house cold at night, and it is a needless expenditure.

Roofs.—The subject of roofing farm buildings may be summarized in this advice: Use patent roofing if you know of a variety that will last; if not, use shingles. Shingle roofs re-

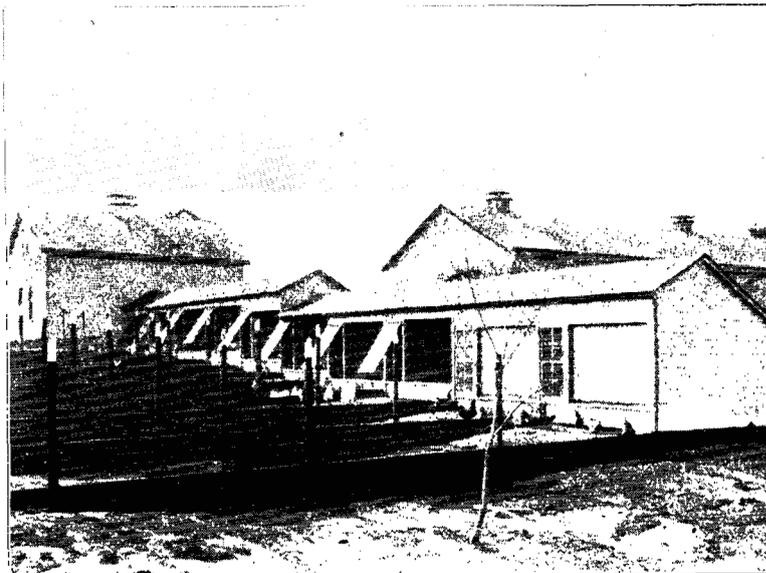
quire a steeper pitch than do roofs of prepared roofing. A shingle roof can be made much warmer by using tightly laid sheathing covered with building-paper. Especial care should be taken that the joints at the eaves of the house are tightly fitted.



An improperly ventilated poultry-house.

Ventilation.—The object of ventilating a chicken-house is to supply a reasonable amount of fresh air, and, equally important, to keep the house dry. Ventilation should not be by cracks or open cupolas. Direct drafts of air are injurious, and ventilation by such means is always the greatest when the least needed. A thorough scheme of ventilation is by a system of pipes that removes the foul air from near the floor, while the corresponding fresh air is forced to enter at the top of the room. This system of ventilation, when properly constructed, works well, but there are other methods which are more practical. The latest, best and cheapest scheme for providing ventilation without drafts is the curtain-front poultry-house. Such houses are constructed with a portion of the south side made of canvas or oiled muslin attached to a hinged frame. By such a provision a steady current of fresh air enters the house while the carbon dioxid and moisture of the air pass outward through the curtain. This ventilation takes place with-

out any air-current and consequent cooling of the house. In such houses similar curtains are usually provided to enclose the roosts. With this arrangement it is possible to make a house an open shed in hot weather, or, as the weather grows colder, to provide either one or two walls between the roosting closet and the outside air. The photographs and drawings of this bulletin amply illustrate the curtain-front styles of poultry-house construction.



Kansas Experiment Station poultry-house and storehouse No. 1.

Roosts.—Make all roosts on the same level. The ladder arrangement is a nuisance and offers no advantage. Arrange the roosts so that they may be readily removed for cleaning. Do not fill the chicken-house full of roosts. Put in only enough to accommodate the hens, and let these be on one side of the house. The floor under the roosts should be separated from the feeding floor by a board set on edge, or, better still, a tight roost-platform may be built under the perches. By this latter scheme the entire floor of the house is available as a scratching-floor.

Nests.—For laying flocks the nests must be clean, secluded and plentiful. Boxes under the roost-platform will answer, but a better plan is to have the nest upon a shelf above the

ground floor under the roosting platform. The nests shown in the plans for a poultry-house in this bulletin are so arranged as to allow the hen to enter from the dark side. They have no bottom and may be readily removed and cleaned. Nests should be constructed so that all parts are accessible to a white-wash brush, that the lice may be eradicated. The less contrivances in a chicken-house the better.

Yards.—A man who is engaged in careful poultry breeding will need one or more yards, the extent and style of which will depend upon the kind of chickens bred and the number of pens mated during the breeding season. The farmer can get along very well without any chicken-yard at all. It will, however, prove a very convenient arrangement if a small yard is attached to the chicken-house. The house should be arranged to open either into the yard or out into the range. This yard may be used for fattening chickens or confining cockerels.

CONCLUSION.

The Kansas farmer, or the farmer in general, has not yet fully recognized the full value of poultry on the farm for supplying food for his table. Besides the eggs that they produce, which are being recognized as one of the most wholesome food products that we have, the poultry should furnish to the farmer the bulk of his meat for the year, which can be had at all times in a fresh and healthy condition. There is no other meat that can be produced as cheaply and is as wholesome and digestible according to the chemist's analysis.

It is hoped that the farmers, and all people who are in position to raise poultry, will recognize the full value of the poultry industry.

Acknowledgment of faithful and efficient service is due Mr. Milo Hasting and Mr. W. A. Lamb.