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A POULTRY SURVEY IN KANSAS

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TABLE OF CONTENTS

	PAGE
STATEMENT OF THE PROBLEM.....	5
INFORMATION SECURED BY THE SURVEY.....	7
Types of farms visited.....	7
Number, distribution, and quality of stock.....	9
Housing conditions.....	13
House construction.....	16
Incubation.....	23
Brooding losses.....	23
Brooding practices.....	27
Management of flocks.....	29
Feeding practices.....	31
Breeding.....	37
Diseases and parasites.....	39
Marketing.....	41
Miscellaneous information.....	45
SUMMARY.....	47
APPENDIX.....	49
Poultry production questionnaire.....	49
The progress of the poultry industry in Kansas, 1919 to 1926.....	51

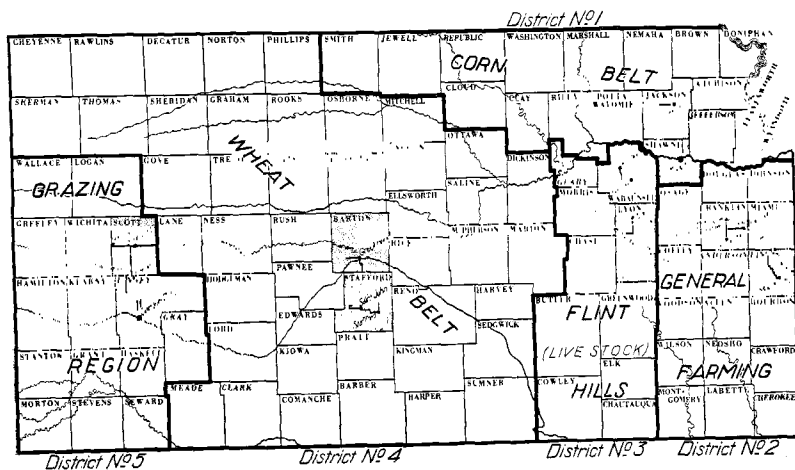


FIG. 1.—Map of Kansas showing the five districts classified according to the type of agriculture pursued; also the location of the two counties surveyed in each district. Counties with and without agricultural agents were used in each district with the exception of district No. 1, where farm bureaus have been organized in both Shawnee and Jackson counties for some years.

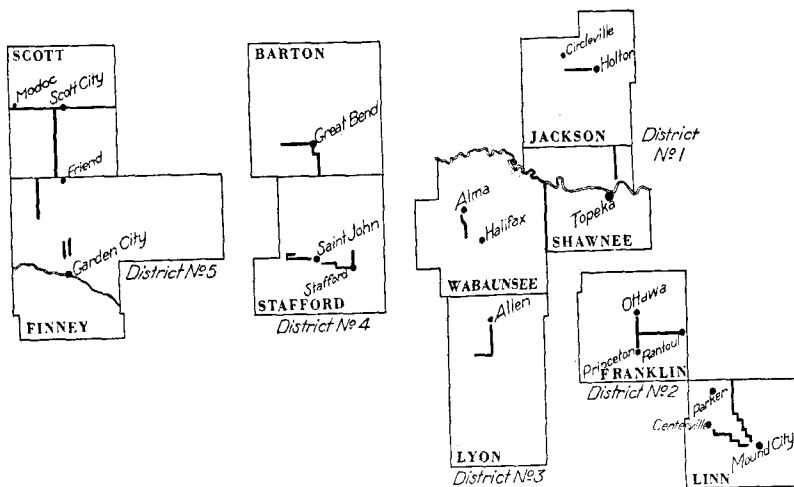


FIG. 2.—The exact territory covered in the 10 counties surveyed is indicated by the heavy black lines. Main roads and sideroads were traveled in each county. The difference in the length of the lines in the east and west portions is due to the difference in population in these sections. One had to travel many miles in the central and west portions of the state to find 25 farms.

A POULTRY SURVEY IN KANSAS¹

LOYAL F. PAYNE AND HOWARD H. STEUP

STATEMENT OF THE PROBLEM

Poultry statistics are collected annually in Kansas by the assessors, but like the information gathered by the United States census takers every five or ten years, only numbers and values of poultry raised and products sold are reported. Information of this nature, while exceedingly valuable, is necessarily based upon estimates and it does not indicate the practices or shortcomings of the industry.

Those intrusted with educational and experimental work must go beyond the statistical information and determine both the conditions and problems of the average poultry raiser. With an accurate diagnosis of the problems one is better able to prescribe remedies and improve many obsolete and unsuccessful practices now used. After one has talked balanced rations and open-front houses for ten years it is easy to make oneself believe that the majority of poultry raisers know and practice good feeding and housing. Such an idea can be quickly contradicted in Kansas if one will go to the trouble to start across the country and inspect all the farms along the route. Whether one is visiting poultry farms or talking or writing about them, as a rule, his attention is focused upon the successful farms which are well above the average when any section in its entirety is considered. While these exceptional cases may serve as beacon lights to show the way to others, they cannot accomplish all that is desired. It seems to the writers that in the future more attention by educators and publicists must be focused on the *average* if the greatest progress is to be made. To write, talk, and draw illustrations in terms of the average rather than the exceptional will reach effectively a far greater number.

To this end a poultry survey was taken in June and July, 1926, the object of which was to secure a cross section of accurate information on all phases of the poultry industry of Kansas from the reproduction of stock to the marketing of poultry products. The survey included portions of 10 different counties in 5 well recognized

Acknowledgment.--The material for this bulletin was collected with the coöperation of the Division of College Extension of Kansas State Agricultural College. Mr. J. H. McAdams and Mr. G. T. Klein, poultry specialists in the Division of College Extension, assisted the authors in making the survey.

1. Contribution No. 39 from the Department of Poultry Husbandry.

sections of Kansas, each of which represents a different type of farming. There are 105 counties in Kansas, 63 of which have organized farm bureaus and county agricultural agents. Six of the counties chosen had county agricultural agents and 4 did not. The counties surveyed were not exceptional for poultry work, but were selected as representative of the sections, and 25 farms were visited in each county. A starting point was established in each county and from that point every farm was surveyed as the inspector traveled down the road until 25 had been visited, except in a few cases where roads did not permit continuing. Of the 25 farmers interviewed in each county, 12 lived on main traveled roads and 13 lived on a side or less traveled road.

A list of 43 main questions with many subquestions was prepared and used in making the survey. This questionnaire will be found in the appendix.

A responsible person, usually the wife or the husband on the farm, was always sought to answer the questions. Many of the answers were obtained by direct questions, some by discussion, while others, such as types of houses, quality of stock, sanitation, etc., were observed and recorded without questioning. Each surveyor carried a yardstick to measure the actual size of the house, windows, and open front.

The location of the counties surveyed in the five districts is shown in figure 1, and the approximate location of roads traveled in each county are illustrated in figure 2. The accurate recording of this information will make possible duplicating the work at some future date if it should ever seem advisable in order to measure the progress, or lack of progress, which might take place over a given period of time.

While the territory covered is relatively small compared with the vast area of the state, it was believed to be fairly representative of the state and to that end would not only show actual conditions and practices at this time, but would also show what types of poultry improvement work were most needed. The facts revealed will be of great value in shaping the policies of those in charge of experimental and extension work.

A detailed report of the information secured, accompanied by a discussion of each main heading considered, is given in Tables I to XIII.

INFORMATION SECURED BY THE SURVEY

TYPES OF FARMS VISITED

To grasp the full significance of this survey it is necessary to become familiar with the nature of the farms from which the data were taken. As has been explained before, there was no previous selection as to which farms were to be visited, but they were taken as they came along the roads selected at random. The object of this method of selection was to obtain figures that could be said to represent the average conditions of Kansas farms.

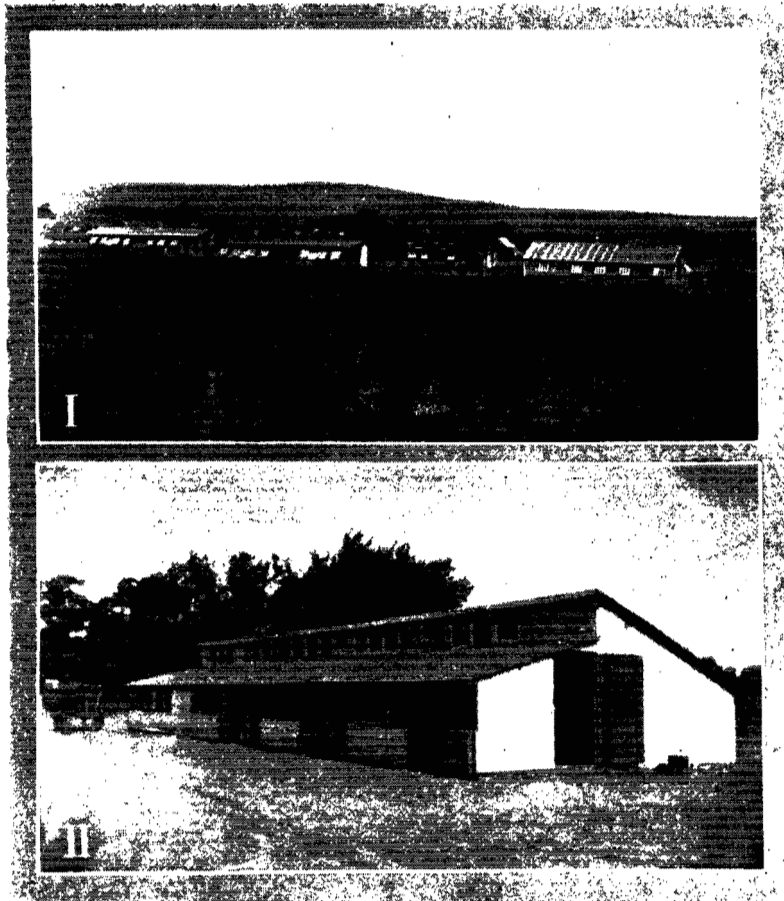


FIG. 3.—(I) A commercial poultry farm in Wabaunsee county located seven miles from a small town. Fourteen hundred hens were kept on this farm. (II) One of the few remaining semimonitor types of poultry houses. Six hundred hens were kept on this general farm.

TABLE I.—Types of farms visited.

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
TYPE OF FARMING PRACTICED:												
General.....	35	70	40	80	25	50	4	8	37	74	141	56.4
Grain.....	2	4	5	10	4	8	42	84	5	10	58	23.2
Live stock.....	1	2	1	2	16	32			5	10	23	9.2
Poultry.....	3	6	2	4	2	4	2	4			9	3.6
Dairy.....	4	8	1	2	3	6					8	3.2
Fruit.....	4	8									4	1.6
Hay.....			1	2					3	6	4	1.6
Market gardening.....	1	2					2	4			3	1.2
Totals.....	50	100	50	100	50	100	50	100	50	100	250	100
TENANCY:												
Farms owned.....	42	84	35	70	28	56	37	74	18	36	160	64.0
Farms rented.....	8	16	14	28	21	42	12	24	32	64	87	34.8
Farms leased.....			1	2	1	2	1	2			3	1.2
	Number of acres		Number of acres		Number of acres		Number of acres		Number of acres		Number of acres	
SIZE OF FARMS:												
Largest farm.....	400		400		2,000		880		30,000		30,000	
Smallest farm.....	1		32		10		4		20		1	
Average of all farms.....	96		142		234		221		368		212	

A POULTRY SURVEY IN KANSAS

9

Table I gives in tabulated form the size, tenancy, and type of farming practiced on the 250 farms visited on the survey. It will be noted that districts 1, 2 and 5 consisted mainly of farm on which general farming was practiced. One-half of the farms visited in district 3 were general farms, but since this district represented the cattle-raising area of the Flint Hills there was also a considerable number of live-stock farms and one commercial poultry farm. (Fig. 3.) District 4, representing the wheat belt of Kansas, consisted almost entirely of grain farms. Poultry, dairy, fruit, hay, and market gardening farms were also visited, but they were fewer in number and were found to be distributed among the three main types. The farther west in the state the survey progressed the less varied became the types of farming. District 1 had seven types of farming represented; district 2 had six types; district 3 had five types; districts 4 and 5 had only four types represented. Since this distribution was the generally accepted opinion of the farming practices of each of these districts, it is evident that the farms visited on this survey were typical of existing conditions.

The average size of all farms visited was 212 acres, which is a little smaller than the average Kansas farm. This is due in part to the fact that this survey included all farms visited, irrespective of size or conditions, whereas most state summaries do not include any tracts under three acres in size. The smallest farm visited was a one-acre tract three miles from Topeka in district 1. The largest farm was a 30,000-acre ranch located in district 5. The other farms fell in between these limits in about the expected frequency.

Two-thirds of the farms were owned by the operators; one-third were either rented or leased. This ratio is very close to the one reported in the 1925 census report for Kansas. From these comparisons it seemed safe to assume that the results of this survey closely approximate state conditions, and that conclusions drawn from these survey figures are representative of the entire state.

NUMBER, DISTRIBUTION, AND QUALITY OF STOCK

The average size of all the flocks was found to be 183 birds. Of these, 99 were pullets, 77 were hens, 6 were male birds, and 1 was a capon. These figures, shown in Table II, indicate one reason why the average Kansas hen is reported by census figures to lay only 54 eggs a year. Kansas farmers are keeping too many old hens in proportion to the number of pullets. A bird usually will lay more eggs during her pullet year than in any other year thereafter.

TABLE II.—Number, distribution, and quality of stock.

	District 1		District 2		District 3		District 4		District 5		All farms	
Chickens. AVERAGE SIZE OF FLOCKS: Number of pullets..... Number of hens..... Number of males..... Number of capons..... Totals..... Farms Number Per cent QUALITY OF FLOCKS: Good..... Medium..... Poor..... FREQUENCY OF BREEDS AND VARIETIES: White Leghorn..... Rhode Island Red..... Barred Plymouth Rock..... Buff Orpington..... White Wyandotte..... White Plymouth Rock..... Rhode Island White..... Mottled Ancona..... Brown Leghorn..... Buff Leghorn..... Buff Plymouth Rock..... Buff Wyandotte..... Buff Minorca..... White Minorca..... Black Minorca..... Light Brahma.....	98 73 8 0		124 92 No record 0		139 120 11 3		63 41 6 0		73 59 5 0		99 77 6 1	
	179		216		273		110		137		183	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
	11	22	6	12	9	18	6	12	4	8	36	14.4
	22	44	16	32	13	26	23	46	24	48	98	39.2
	17	34	28	56	28	56	21	42	22	44	116	46.4
	18	36	16	32	15	30	7	14	11	22	67	26.8
	18	36	11	22	8	16	20	40	10	20	67	26.8
	9	18	7	14	4	8	13	26	1	2	34	13.6
9	18	1	2	3	6	8	16	8	16	29	11.6	
10	20	5	10			5	10			20	8.0	
6	12			2	4	4	8			12	4.8	
5	10	1	2	3	6			2	4	11	4.4	
2	4	5	10			3	6			10	4.0	
5	10	1	2			2	4			8	3.2	
1	2	2	4	2	4			2	4	7	2.8	
		1	2			2	4			3	1.2	
2	4							3	6	3	1.2	
1	2			1	2					2	.8	
										2	.8	
								1	2	1	.4	
						1	2			1	.4	

TABLE II.—*Concluded.*

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
<i>Frequency of Breeds and Varieties—Concluded.</i>												
Silver Campine.....							1	2			1	.4
Silver Laced Wyandotte.....							1	2			1	.4
White Orpington.....					1	2					1	.4
Cross Breeds.....	1	2	1	2	7	14	7	14	24	48	40	16.0
Mongrels.....	6	12	20	40	17	34	10	20	5	10	58	23.2
Totals.....	93	(a)	71	(a)	63	(a)	84	(a)	67	(a)	378	(a)
Poultry Other than Chickens:												
Turkeys.....					1	2	8	16	22	44	31	12.4
Geese.....	6	12	6	12	8	16	3	6	5	10	28	11.2
Ducks.....	1	2	1	2	10	20	6	12	6	12	24	9.6
Guineas.....	2	4	5	10	2	4	2	4	3	6	14	5.6
Totals.....	9	18	12	24	21	42	19	38	36	72	97	38.8

(a) These columns will not total 100 per cent as many farms kept more than one breed of chickens and the per cents given are based on the number of farms visited.

Therefore it is considered poor management to keep more hens than one-half the number of pullets. If this ratio is maintained it will permit a rigid culling of pullets after their first laying year, thereby eliminating all unprofitable individuals. If the farms of Kansas are to average 176 females in their poultry flocks, they will find it more profitable to have about 118 pullets and only 58 hens instead of the present ratio of 99 pullets to 77 hens.

In addition to laying more eggs than hens, the pullets will produce more abundantly during the fall and winter months when prices are high. Hens should be used to reproduce the flock, since as breeders they are more valuable than pullets, especially if the pullets lay heavily during the fall and winter. Therefore the ideal combination is twice as many pullets as hens, using the pullets for fall and winter production of market eggs and the hens for the production of hatching eggs in the spring. This ratio applies to the flocks handled on a commercial market-egg basis.

Some flocks are used primarily to produce hatching eggs, in which case a larger proportion of adult hens might prove desirable, since chicks from pullet eggs are not as satisfactory as those from older birds. The ordinary flock can usually be reproduced from the hens if they represent one-third of its number.

From the breeding standpoint the figures of Table II show a scarcity of male birds. The average flock of 176 females contains only 6 males, which, under the most favorable conditions, would be able to properly care for only 120 females. This situation is not as serious as the table indicates, however, for in district 2 no record was taken of the male-bird population. This would tend to lower the average number of male birds for all farms. Then, too, quite a few farms reported that they do not keep any males as breeders since they buy baby chicks every spring and do not bother with hatching eggs. Others sell the males in June to produce infertile eggs for market purposes. These conditions have combined to give a low male average in the summary, whereas on most farms producing hatching eggs there were sufficient males.

The average number of capons for all farms is given in Table II as one. The actual value was only three-fifths of a capon, but all figures are recorded to the nearest whole number. This scarcity of capons shows that the Middle West has not yet awakened to the appreciation of such fowls, although the number raised is increasing each year. If the number of turkeys on the holiday markets diminishes, capons will increase as they are a profitable side-line to poultry raising where markets are available.

A POULTRY SURVEY IN KANSAS

13

The quality of Kansas flocks can be very readily improved. The men taking this survey may each have applied a different standard to the flocks visited, but even in spite of this variation there was a marked uniformity in poor quality reported in each district. Only 14 per cent of the farms visited, or 36 out of 250 flocks, has birds that approached standard-bred qualifications and egg type closely enough to be considered good quality. Almost one-half the flock, 46 per cent, was rated as having poor quality.

This lack of quality was offset in some degree by the number of standard-bred varieties kept and the absence of the unsightly and unprofitable mongrel flocks. Many flocks contained more than one standard-bred variety since many of the farms were changing varieties and had not yet entirely completed this change at the time of the visit. On the 250 farms visited there were found 378 varieties, showing that the farms averaged approximately one and one-half varieties each. All of these, except 40 crossbreds and 58 mongrels, were standard-bred varieties. Table II lists the per cent of crossbreds and mongrels at 16 and 23 per cent, respectively. This means, as the table foot-note explains, that these off-type breeds were found on 16 and 23 per cent of the farms, respectively and not that they represent that per cent of the chicken population. On the basis of all varieties these crossbreds and mongrels would represent only 10 and 16 per cent, respectively, of the chicken population. Improvement can be made by entirely eliminating the mongrels; by using the crossbreds only under certain rare conditions; and by improving the quality of the standard-bred flocks.

In Table II is given a list of the standard breeds of poultry in the state in the order in which they appeared in popularity. It also shows the number of farms raising turkeys, geese, ducks, and guinea fowl.

HOUSING CONDITIONS

The number of poultry raised in Kansas has been increasing rapidly in the past few years. This increase has outdistanced the housing accommodations, and this survey clearly shows that Kansas poultry is not satisfactorily housed. In the first place there is not sufficient room provided. For best and most profitable results it is unwise to crowd the flock into too small quarters. Four square feet of floor space per bird is considered ideal, although for flocks averaging over 100 birds three and one-half square feet will suffice.

Table III gives in tabulated form the conditions found on the farms visited. The average was only 2.2 square feet of floor space per bird, which means that the average farm was wintering about

TABLE III.—Housing conditions.

	District 1		District 2		District 3		District 4		District 5		All Farms	
	1911		1916		1910		1911		1911		1912	
AVERAGE YEAR HOUSES WERE BUILT												
SIZE OF HOUSES:												
Average floor space of hen houses.....	433 sq. ft.		458 sq. ft.		522 sq. ft.		309 sq. ft.		295 sq. ft.		403 sq. ft.	
Average floor space per bird.....	2.4 sq. ft.		2.1 sq. ft.		1.9 sq. ft.		2.8 sq. ft.		2.2 sq. ft.		2.2 sq. ft.	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
Sufficient floor space for size of flock.....	20	40	16	32	14	28	21	42	9	18	80	32.0
Farms using dropping boards.....	12	24	12	24	5	10	3	6	12	24	44	17.6
Farms using dust baths.....	34	68	31	62	23	46	41	82	28	56	157	62.8
Farms using feed hoppers.....	17	34	19	38	28	56	19	38	11	22	94	37.6
Farms having housing conditions satisfactory.....	13	26	9	18	7	14	12	24	4	8	45	18.0

A POULTRY SURVEY IN KANSAS

15

60 per cent more birds than its poultry house would properly accommodate. Such practice is lowering the efficiency of the flock and reducing profits. We believe the average Kansas farm would make more money from 120 fowls housed properly in its 403 square feet of house room than it is now making by crowding 183 fowls into this space. Table III further shows that this overcrowding is being practiced on about two-thirds of the farms. The other one-third are furnishing sufficient housing space.

The poultry houses had an average building date of 1912. Age in itself is no drawback if the house is well preserved and of proper design. The great trouble with old henhouses is that they usually do not include many new features which have been found essential for best results.

Droppings boards should be underneath the perches to collect and retain the filth that otherwise goes to the floor and soon brings about an insanitary condition and makes the house extremely difficult to clean. In addition to this, droppings boards shut off all circulation of air from underneath and thus, by checking this draft, are a big factor in eliminating roup. The benefits derived from these two sources will more than pay for the cost of installing droppings boards, yet the survey showed that only 17.6 per cent of the farms are making use of this help.

Feed hoppers provide a sanitary method of feeding the flock and tend to reduce intestinal infections. Only 37.6 per cent of the farms were supplying these and not quite two-thirds, 62.8 per cent, were making use of the dust bath, a valuable factor in combating lice, but preferably used outside of the poultry house.

Housing conditions were reported as satisfactory on only 18 per cent of farms. This means that about one farm in every five is giving its flock the opportunity to do its best. Great benefit can be obtained by eliminating this overcrowding either by building more house room or wintering a fewer number of birds.

It would also be helpful to remodel the old henhouse. (Fig. 4.) Better conditions can be easily obtained by making changes that involve some work but little cost for materials. More open fronts should be provided and the openings arranged so as to admit direct sunlight over as much of the floor space during the winter months as possible. The providing of one square foot of open front for every ten square feet of floor space would improve many of the houses visited. The adding of straw lofts would also increase the efficiency of the high ceiling gable and uneven-span-roof types.



FIG. 4.—(I) A poultry yard barren and void of both vegetation and shade. Chickens confined in this house would receive none of the beneficial ultra-violet rays from the sunlight. It could be easily modernized by providing open fronts where the wind bafflers are located. (II) An example of abundant shade provided near the poultry house.

HOUSE CONSTRUCTION

Table IV gives the construction details of the poultry houses found on this survey. It has been clearly demonstrated that the open-front type of house gives best results in Kansas. (Fig. 5.) This style permits the entrance of fresh air in sufficient quantities and also gives to the birds the opportunity of utilizing the ultra-violet ray portion of the abundant Kansas sunshine. It is quite easily understood why fresh air is needful as almost everyone has at some time or other experienced the stifling effect of having to remain in a foul atmosphere. Poultry kept in an improperly ventilated henhouse also becomes inactive and sluggish, and this slow-

A POULTRY SURVEY IN KANSAS

17

ing up of the body processes results in a marked decrease in egg production. To obtain winter eggs, and these are the most profitable, the open-front house is necessary. These openings are covered only in extreme cold weather and then by muslin that still permits the entrance of fresh air and ultra-violet rays.

Table IV show that only one-half of the poultry houses visited had open fronts. Some of these openings were not large enough to ventilate properly, but were better than no ventilation. For proper ventilation at least one-fourth of the total area of the front side should be open, and the other three sides should be absolutely tight

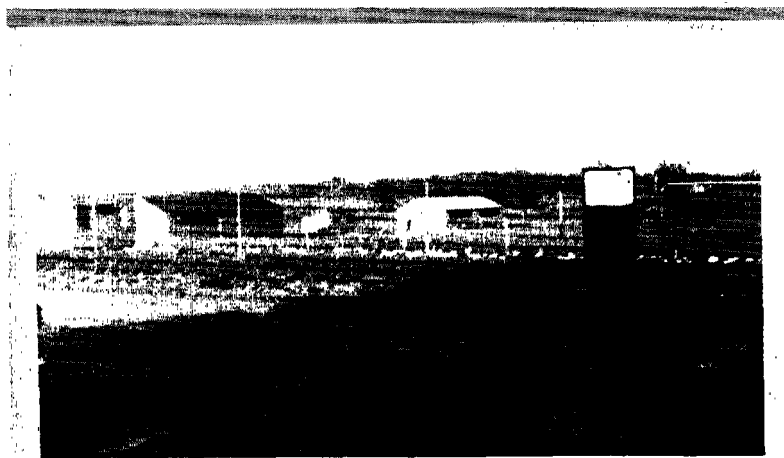


FIG. 5.—Two gable-roof, open-front, straw-loft laying houses on a commercial poultry farm in Cloud county. Chicks are brooded in separate portable colony brooder houses and an attractive poultry fence surrounds the farm. (This is the only illustration used that was not taken on the survey.)

so as not to permit, a draft through the house except during the summer when a rear ventilator is desirable. Only 30 per cent of the houses had one-fourth or more open front, while on over two-thirds of the farms the birds were living under the handicap of lack of fresh air. There is undoubtedly room for much improvement in this respect in poultry-house construction in Kansas.

Direct sunlight is of great importance to poultry. Investigations have shown that it is the ultra-violet rays of the sunlight that are of importance. Whenever these are available they will enable the birds to synthesize vitamin D, which is the vitamin most commonly missing in poultry rations. Lack of this vitamin causes leg weak-

TABLE IV.—House construction.

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
Types of Fronts:												
Open two-thirds or more of front area.....	2	4			1	2					3	1.2
Open one-half of front area.....	5	10	7	14	1	2					13	5.2
Open one-third of front area.....	9	18	6	12	13	26	4	8	7	14	39	15.6
Open one-fourth of front area.....	2	4	6	12	5	10	2	4	6	12	21	8.4
Open one-fifth of front area.....	4	8	7	14	7	14	9	18	5	10	32	12.8
Open less than one-fifth of front area.....	10	20					12	24	3	6	25	10.0
Total open front houses.....	32	64	26	52	27	54	27	54	21	42	133	53.2
Fronts with no glass nor other openings.....	7	14	14	28	10	20	13	26	14	28	58	23.2
Fronts with glass openings only.....	9	18	10	20	11	22	7	14	13	26	50	20.0
Fronts with glass substitutes.....	1	2			2	4	3	6	2	4	8	3.2
Totals.....	49*	98*	50	100	50	100	50	100	50	100	249*	99.6*
Types of Roofs:												
Shed.....	26	52	21	42	22	44	21	42	36	72	126	50.4
Gable.....	15	30	22	44	21	42	25	50	8	16	91	36.4
Uneven span.....	6	12	1	2	5	10	3	6	4	8	19	7.6
Seminimitor.....	2	4	5	10	2	4	1	2	2	4	12	4.8
Monitor.....			1	2							1	.4
Totals.....	49*	98*	50	100	50	100	50	100	50	100	249*	99.6*
Straw lofts.....	3	6			1	2					4	1.6
Board lofts.....	1	2			2	4			1	2	4	1.6

TABLE IV.—*Concluded.*

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
ROOFING MATERIAL:												
Shingles.....	21	42	25	50	29	58	20	40	19	38	114	45.6
Roofing paper.....	19	38	19	38	10	20	8	16	14	28	70	28.0
Uncovered boards.....	6	12	3	6	7	14	10	20	14	28	40	16.0
Sheet iron.....	3	6	2	4	3	6	12	24	1	2	21	8.4
Straw.....			1	2	1	2			2	4	4	1.6
Totals.....	49*	98*	50	100	50	100	50	100	50	100	249	99.6*
TYPES OF FLOORS:												
Dirt.....	34	68	46	92	34	68	37	74	45	90	196	78.4
Concrete.....	11	22	2	4	13	26	9	18	2	4	37	14.8
Wood.....	3	6	2	4	2	4	4	8	3	6	14	5.6
Tile.....	1	2									1	.4
Stone.....					1	2					1	.4
Totals.....	49*	98*	50	100	50	100	50	100	50	100	249*	99.6*
TYPES OF WALL CONSTRUCTION:												
Wood.....	48	96	49	98	46	92	47	94	46	92	236	94.4
Concrete.....							1	2			4	1.6
Sheet iron.....			1	2			2	4	3	6	3	1.2
Wood and stone.....					2	4					2	.8
Tile.....	1	2							1	2	2	.8
Stone.....					1	2					1	.4
Straw or fodder.....					1	2					1	.4
Totals.....	49*	98*	50	100	50	100	50	100	50	100	249*	99.6*

* One farm in district number one had a flock of chickens but did not have a poultry house.

ness in young stock and will cause the breeding pens to produce soft-shelled and inferior hatching eggs. Since Kansas is amply supplied with sunshine, poultrymen should take advantage of it and use this natural source of vitamin D instead of supplying a more expensive and more or less artificial product.

The sun's rays appear to pass through ordinary window glass, but in reality all of them do not. Among those that cannot pass are the ultra-violet rays, those of most importance to poultry raisers. Therefore, since window glass will not let in these vita rays and neither will it permit any entrance of fresh air, there seems to be no particular reason for using glass windows in the front of a poultry house. The open front lets in both fresh air and direct sunshine, even when the muslin curtain is over the opening, and since muslin is cheaper it is certainly the practical front for all poultry houses.

Table IV shows that one-fifth of the houses visited had window glass for their front openings and that nearly one-fourth of the houses were boxed tight with no openings of any kind except a wooden door (fig. 6), indicating much room for improvement in house construction.

Table IV shows a few houses using patent-glass substitutes. These glass substitutes are so prepared that about one-fourth of the ultra-violet rays pass through. This is sufficient for vitamin D requirements, but since they do not permit fresh air to enter and are more expensive than muslin there would seem to be no practical reason for their use in poultry-house construction.

Table IV also gives the figures on the types of roof constructions found. Since most poultry houses are constructed by the owner, and since the shed type of roof is the easiest to construct, it is easy to understand why this type was most popular, being found on one-half of the houses visited. This type is not as well adapted to the use of straw lofts as is the gable roof. As Kansas poultrymen realize more and more the benefits derived by their flocks in the heat of summer from the cooling effect of the straw loft, the gable roof will become more popular and more straw lofts will be installed. Table IV shows that a very small per cent of the present-day poultry houses have a straw loft.

Shingles seemed to be the most popular roofing material, followed in popularity by roofing paper. Forty farms had no roof on the poultry house except for uncovered boards which were not water tight. In some sections of the state the rainfall is light, but even this would offer no excuse for such carelessness in house construc-

A POULTRY SURVEY IN KANSAS 21

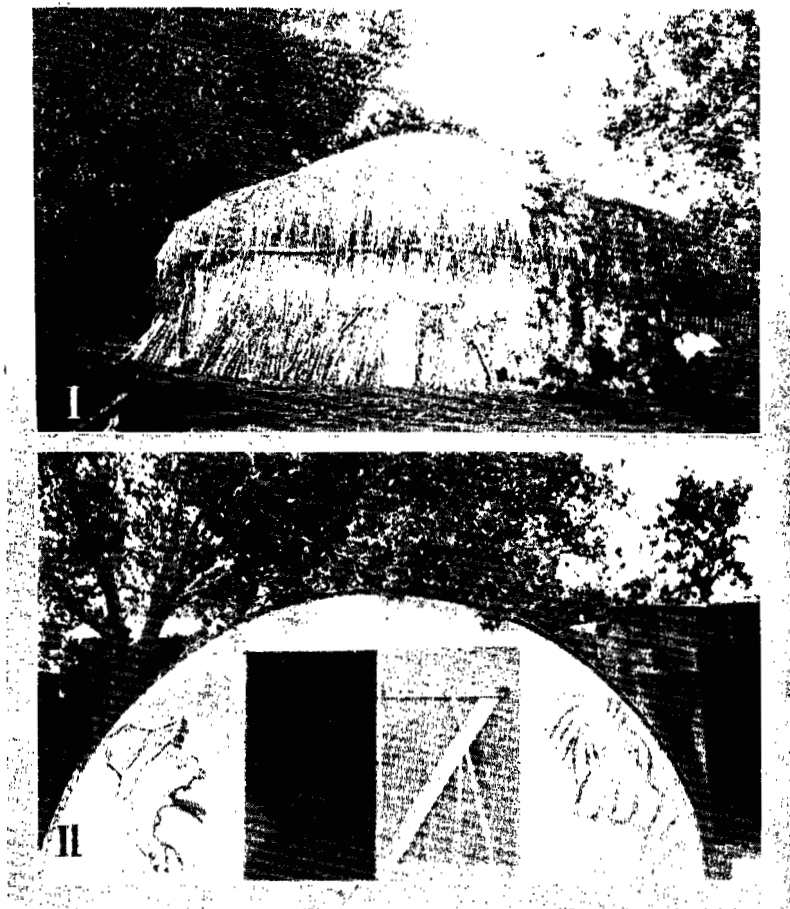


FIG. 6.—A variety of houses were encountered, from cane stockades covered with straw (I) to turned-over grain bins artistically decorated (II).

tion. During the late fall and winter months a poultry house dampened on the inside just once will cause more trouble and loss than a roof covering would cost.

Nearly 80 per cent of the houses had dirt floors. This, combined with the large number not using droppings boards, is very conducive to insanitary conditions. Day by day the dirt of the floor becomes full of filth and parasites and is almost impossible to clean without removing the old floor and hauling in a clean fill. The labor involved in such a cleaning practice, or else the loss experienced by

TABLE V.—Incubation.

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
BABY CHICK POPULATION (1926) PER FARM:												
Average number of chicks hatched on the farm.....	280	65.6	435	90.8	517	91.2	327	92.6	251	79.6	362	84.6
Average number of chicks bought.....	132	30.9	24	5.0	40	7.0	21	6.0	64	20.4	56	13.1
Average number of chicks custom hatched.....	15	3.5	20	4.2	10	1.8	5	1.4			10	2.3
Total average number of chicks.....	427	100	479	100	567	100	353	100	315	100	428	100
	Farms		Farms		Farms		Farms		Farms		Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
METHODS OF INCUBATION:												
Natural.....	29	58	25	50	24	48	33	66	28	56	139	55.6
Artificial.....	6	12	23	46	7	14	4	8	9	18	49	19.6
Both.....	15	30	2	4	19	38	13	26	13	26	62	24.8
Totals.....	50	100	50	100	50	100	50	100	50	100	250	100
Farms buying baby chicks.....	14	28	2	4	7	14	6	12	7	14	36	14.4
Farms having eggs customed hatched.....	6	12	2	4	1	2	1	2			10	4.0
Farms selling baby chicks.....	2	4	2	4	2	4	3	6	1	2	10	4.0
Farms having incubators.....	19	38	22	44	24	48	16	32	20	40	101	40.4
	Egg capacity		Egg capacity		Egg capacity		Egg capacity		Egg capacity		Egg capacity	
AVERAGE INCUBATOR CAPACITY:												
For farms owning incubators.....	361		283		390		313		195		308	
For all farms.....	137		129		200		96		125		137	

A POULTRY SURVEY IN KANSAS

23

not keeping things sanitary, soon more than equals the cost of installing a properly constructed concrete or hollow-tile floor.

Table IV further shows that wood is still the most, popular material for poultry-house construction. Nearly 95 per cent of the houses were constructed with wood and concrete. Sheet iron, wood and stone, tile, stone, and straw or fodder followed in order of popularity to comprise the other 5 per cent.

Many farms had more than one poultry house. Some of these were of similar construction and some were not. Table IV is arranged to show the results on the basis of one henhouse per farm. Such figures were obtained by multiplying the number of farms having chicken houses by the per cent of each type found in the total summary.

INCUBATION

Table V shows the baby-chick population on the farms visited. The average number of chicks on each farm was 428. Of this number 362 were hatched on the farms, 56 were bought, and 10 were custom hatched by hatcheries. This means that, the hatcheries were supplying only 13.1 per cent of the total baby-chick population, and that they were custom hatching only 2.3 per cent.

It is interesting to note the types of hatching used to produce the 428 chicks found on each farm. Most of these were hatched under hens, as Table IV shows that 138 farms, or 55.6 per cent, used this method of incubation entirely. Forty-nine farms, or 19.6 per cent, used only incubators, either their own or the hatchery's, and the remaining 62 farms, or 24.8 per cent, hatched some chicks with hens and some with incubators.

Only 36 farms were buying day-old chicks, and some of these were not buying their entire number. Ten farms were having eggs custom hatched and ten farms were hatching more than enough chicks for their own use, so that they could sell the surplus.

Incubators were found on 101 farms, or 40.4 per cent. The average capacity of these incubators was 308 eggs per farm. If the farms not owning incubators are included in this average, which would then include all farms visited, the average incubator capacity per farm was 137 eggs.

BROODING LOSSES

Table VI shows a detailed enumeration of the brooding losses on the farms visited. The figures are arranged to show these losses from various angles. The first division shows the average number of chicks brooded per farm under the mother hen or under natural

TABLE VI.—Brooding losses.
(First ten weeks.)

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
BROODING LOSSES BY NATURAL METHODS:												
Average number of chicks brooded.....	176	100	142	100	281	100	250	100	171	100	204	100
Average number raised to ten weeks.....	124	70.5	106	74.6	209	74.4	171	68.4	127	74.3	147	72.1
Average number lost first ten weeks.....	52	29.5	36	25.4	72	25.6	79	31.6	44	25.7	57	27.9
BROODING LOSSES BY ARTIFICIAL METHODS:												
Average number chicks brooded.....	156	100	300	100	180	100	53	100	101	100	158	100
Average number raised to ten weeks.....	101	64.7	200	66.6	144	80.0	42	79.2	62	61.4	110	69.6
Average number lost first ten weeks.....	55	35.3	100	33.4	36	20.0	11	20.8	39	38.6	48	30.4
BROODING LOSSES WHERE BOTH METHODS ARE USED:												
Average number chicks brooded.....	95	100	37	100	106	100	50	100	43	100	66	100
Average number raised to ten weeks.....	68	71.6	25	67.6	75	70.8	29	58.0	31	72.1	46	69.7
Average number lost first ten weeks.....	27	28.4	12	32.4	31	29.2	21	42.0	12	27.9	20	30.3
BROODING LOSSES FROM NATURAL HATCHED CHICKS:												
Average number chicks brooded.....	156	100	150	100	208	100	200	100	131	100	169	100
Average number raised to ten weeks.....	116	74.4	110	73.3	154	74.0	145	72.5	101	77.1	125	74.0
Average number lost first ten weeks.....	40	25.6	40	26.7	54	26.0	55	27.5	30	22.9	44	26.0
BROODING LOSSES FROM ARTIFICIALLY HATCHED CHICKS:												
Average number chicks brooded.....	78	100	280	100	141	100	32	100	64	100	119	100
Average number raised to ten weeks.....	56	71.8	188	67.1	121	85.8	25	78.1	46	71.9	87	73.1
Average number lost first ten weeks.....	22	28.2	92	32.9	20	14.2	7	21.9	18	28.1	32	26.9
BROODING LOSSES ON FARMS RAISING BOTH TYPES OF CHICKS:												
Average number chicks brooded.....	193	100	49	100	218	100	121	100	120	100	140	100
Average number raised to ten weeks.....	121	62.7	33	67.3	153	70.2	72	59.5	73	60.8	91	65.0
Average number lost first ten weeks.....	72	37.3	16	32.7	65	29.8	49	40.5	47	39.2	49	35.0
BROODING LOSSES BY ALL METHODS:												
Average number chicks brooded.....	427	100	479	100	567	100	353	100	315	100	428	100
Average number raised to ten weeks.....	293	68.6	331	69.1	428	75.5	242	68.6	220	69.8	303	70.8
Average number lost first ten weeks.....	134	31.4	148	30.9	139	24.5	111	31.4	95	30.2	125	29.2

A POULTRY SURVEY IN KANSAS

25

conditions. The average number for all farms so brooded was 204 chicks, of which 147 reached 10 weeks of age. This gave a loss of 57 chicks, or 27.9 per cent, for natural brooding methods.

Some farms were using brooder stoves and artificial methods of raising chicks. The average number of chicks so brooded was 158, and 110 of these reached 10 weeks of age. This made a loss of 48 chicks, or 30.4 per cent, for artificial methods. Other farms used both natural and artificial methods, and the number of chicks so handled averaged 66 per farm. Of these, 46 reached 10 weeks of age, making a loss of 20 chicks, or 30.3 per cent. From these figures it is clear that no one method of brooding was proving more successful than the other, as there is but 2.5 per cent difference between the highest and lowest mortality.

These losses are extremely costly, however, and the poultry raisers of Kansas can do much toward increasing the efficiency of their production by reducing their brooder mortality. There were in 1925 165,879 farms in Kansas. This survey (Table 11) shows that most all of these farms raise chickens. Table VI shows that the average number of chicks lost up until 10 weeks of age is 125 per farm. This would then make a total yearly loss of 20,734,875 chicks for the state of Kansas, or at 12 cents per chick, a money loss of \$2,488,185 each year. This is quite a "leak" in the state's poultry business, and since most of it is avoidable (see Table VII) it behooves each poultry raiser to remedy the defects in his brooding operations.

Since a great many poultry raisers on this survey were attributing their losses to such excuses as "artificially hatched chicks are not as vigorous as hen-hatched chicks," the losses are arranged in Table VI to show if any such difference does exist.

The number of chicks hatched under hens averaged 169 per farm, and of these 125 reached 10 weeks. This made a loss of 44 chicks per farm, or 26 per cent for natural hatching. Incubator-hatched chicks averaged 119 chicks per farm, of which 87 reached 10 weeks, making a loss of 32 chicks, or 26 per cent for artificial hatching. It is clear that there is no significant difference in these losses.

Some farms, however, were raising chicks some of which were hen-hatched and some incubator-hatched. These averaged 140 per farm, and only 91 of these reached 10 weeks. This loss of 40 chicks, or 35 per cent, is considerably greater than that experienced where only one hatching method was used. These results indicate that a farmer will do better by confining himself to one method of incubation.

TABLE VII.—Brooding practices.

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Average per farm		Average per farm		Average per farm		Average per farm		Average per farm		Average per farm	
SIZE OF BROODER HOUSES:												
Average floor space of brooder houses.....	96 sq. ft.		104 sq. ft.		152 sq. ft.		26 sq. ft.		26 sq. ft.		81 sq. ft.	
Average number chicks to each brooder.....	262		316		383		236		254		290	
Average number chicks per square foot of floor space.....	2.7		3.0		2.5		9.0		9.8		3.6	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
BROODER HOUSES:												
Number of farms using brooder houses.....	20	40	26	52	19	38	11	22	15	30	91	36.4
Number of houses permanent.....	15	30	22	44	14	28	7	14	10	20	68	27.2
Number of houses portable.....	5	10	4	8	5	10	4	8	5	10	23	9.2
Number of houses moved to clean ground.....	5	10	3	6	5	10	4	8	1	2	18	7.2
TYPES OF BROODER STOVES:												
Coal stove.....	12	24	17	34	8	16	8	16	4	8	49	19.6
Kerosene stove.....	2	4	5	10	8	16					15	6.0
Small kerosene lamp.....	4	8			1	2	3	6	5	10	13	5.2
Fireless.....	2	4							6	12	8	3.2
Wood stove.....			4	8	1	2					5	2.0
Hot water pipe system.....					1	2					1	.4
FEEDING OF BABY CHICKS FIRST WEEK:												
Number of farms using commercial feeds.....	32	64	26	52	35	70	30	60	24	48	147	58.8
Number of farms using home-mixed feeds.....	18	36	24	48	15	30	20	40	26	52	103	41.2
Number feeding mash only first week.....	22	44	23	46	23	46	31	62	18	36	117	46.8
Number feeding grain only first week.....	19	38	23	46	16	32	19	38	29	58	106	42.4
Number feeding both mash and grain first week.....	9	18	4	8	11	22			3	6	27	10.8
Number feeding milk first week.....	36	72	41	82	37	74	35	70	34	68	183	73.2
Clabber.....	34	68	40	80	30	60	33	66	32	64	169	67.6
Sweet.....	1	2			1	2	2	4			4	1.6
Semisolid.....					2	4			1	2	3	1.2
Cottage cheese.....	1	2	1	2	4	8			1	2	7	2.8
FARMS BROODING DIFFERENT AGED CHICKS TOGETHER.....	41	82	26	52	37	74	46	92	36	72	186	74.4
FARMS PERMITTING CHICKS TO RUN WITH OLDER BIRDS.....	46	92	46	92	47	94	48	96	50	100	237	94.8

A POULTRY SURVEY IN KANSAS

27

BROODING PRACTICES

Table VII shows the various brooding practices in use on the farms visited. The number of chicks kept with each brooder averaged 290, and the average floor space allowed for this number of chicks was only 81 square feet. These figures show that there were 3.6 chicks kept for each square foot of floor space in the brooder house. A safe rule to follow is to confine only 3 chicks to each square foot, so these farms were overcrowding this factor of safety about 20 per cent. There is no question but that this overcrowding was one contributing factor to the losses reported in Table VI. There was one specific instance where the operator had crowded 2,000 baby chicks under a brooder that would scarcely accommodate 1,000 chicks comfortably. This farm reported a loss of 1,000 chicks prior to 10 weeks of age. It is advisable not to try to brood more than 350 to 400 chicks in one unit, regardless of the size of the house.

Despite this very apparent, crowding of too many chicks into too small area of brooder space there was still an average of 138 chicks per farm that apparently had no definite place in which to live. These were taken care of in such nondescript places that their abodes were not listed as brooder houses. All of these chicks, of course, were mothered by hens but they were kept in the poultry house, in the barn, in boxes, or in other makeshift contrivances that added materially to the enormous baby-chicks mortality. (Fig.7.) Troubles and losses with baby chicks will never cease until adequate equipment is supplied. If each poultry raiser could be made to fully realize the handicap imposed upon himself by inadequate equipment, and would stop to figure the money wasted each year in chick losses, he would soon come to see the business soundness of spending for equipment the money wasted in dead chicks.

Perhaps the largest loss of chicks is due to exposure to such parasites as intestinal worms, coccidiosis and the bacillus of white diarrhea. These parasites are nourished, matured, and maintained by older chickens that are infected. These infected individuals are usually allowed free range, and since the parasites are frequently contained in the droppings the entire premises may become infected. If baby chicks range upon this same ground it is not surprising to find that they soon become infected, resulting in a heavy mortality. The only way to prevent such losses is to keep the baby chicks away from sources of contamination.

Table VI shows that 237 farms or 94.8 per cent, were permitting

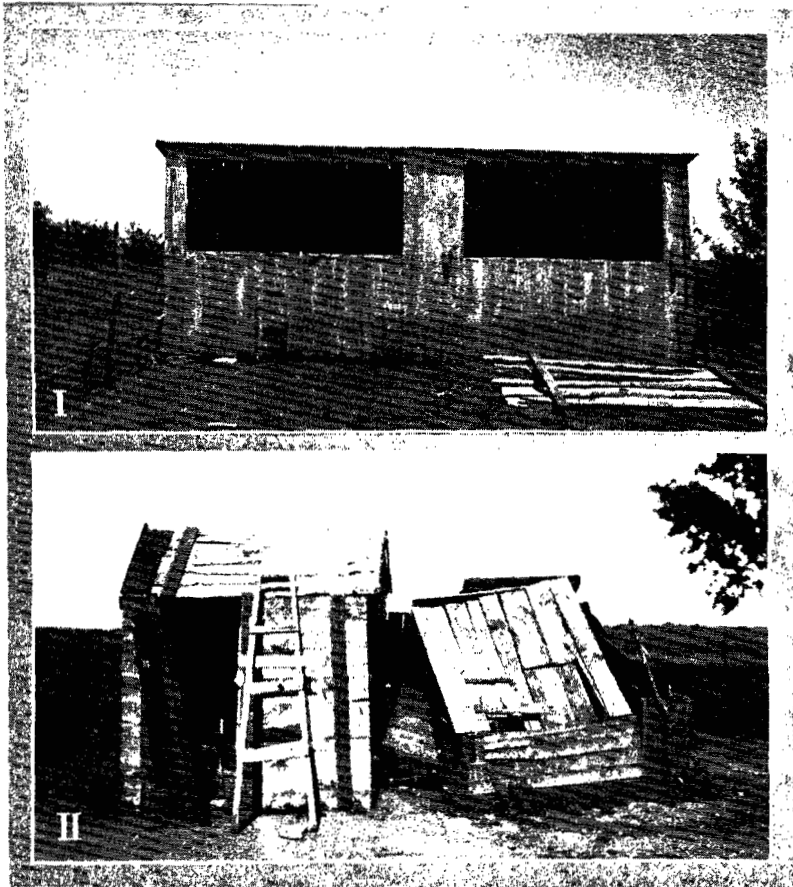


Fig. 7.—Equipment in use on some farms. With such equipment it is not surprising that results are unsatisfactory and that interest in poultry is at a low ebb.

the young chicks to run with the older birds. Table XI shows that 96 farms were having trouble with disease in their older birds at the time of this survey. In addition to the visibly sick birds there are also many birds that are infected with parasites yet do not necessarily show signs of sickness. Yet only 13 farms, or 5.2 per cent, were making any effort to keep their young chicks separated from the older birds or to keep them off ground contaminated by other chickens. This negligence is probably the largest contributing factor toward the heavy chick mortality.

Sixty-eight farms had stationary brooder houses, yet no effort was

A POULTRY SURVEY IN KANSAS

29

made to bring in sand or gravel to offer a fresh, clean run and neither was there any effort put forth to clean the ground in any other manner. Twenty-three farms had movable colony brooder houses and eighteen of these were moving their houses to new ground each year in order to escape soil contamination. This is a very small proportion, only 7.2 per cent, that were seeking a sure and reliable relief from chick mortality.

Table VII further shows that coal-burning brooders, found on 19.6 per cent of the farms, are the most popular in Kansas. This is gratifying in that there is no question but that such a type of brooder stove is most efficient for Kansas conditions. Six per cent of the farms were using kerosene-burning stoves, and 5.2 per cent were still laboring along with the small kerosene lamp brooders. Brooders using kerosene usually carry a great fire hazard, produce damaging fumes in the brooder, and often are not adequate to meet the demands of Kansas climate, so it is well that no greater per cent of farms were found using such a type of brooder equipment. A few farms are still struggling along with the laborious forms of wood burners and fireless brooders that take more time and patience than they are worth.

It is interesting to note the methods of feeding baby chicks that were in practice on the farms visited. More than half of the farms, 58.8 per cent, were buying commercial feeds, while 41.2 per cent were mixing their own feeds at home. Not quite one-half the farms, 46.8 per cent, were feeding mash only the first week; 42.4 per cent were feeding grain only the first week; and 10.8 per cent were feeding both grain and mash the first week. Nearly three-fourths of the farms, 73.2 per cent, were to be commended for feeding milk the first week. Most of these, 67.6 per cent, were feeding the milk in clabber form, while the few others were feeding it sweet, or in the form of condensed buttermilk or cottage cheese.

MANAGEMENT OF FLOCKS

Table VIII gives a summary of the various methods of flock management that were encountered on this survey. Only 24 farms were using a litter on the poultry-house floors during the entire year. A larger number of farms, 162 in all, or 64.8 per cent, were using litter during the winter months, while 64 farms, 25.6 per cent, were not using litter at any time. The object of litter is fourfold. First, it offers an opportunity for exercise as the birds have to scratch and hunt their grain feed. Second, it is extremely helpful in keeping the quarters sanitary as it will absorb the droppings and will greatly

aid in keeping the many dirt floors (reported in Table IV) from becoming filthy with manure. Third, it will greatly add to the comfort of the birds by keeping their feet off cold floors in the winter time and by preventing corns and bumble-foot in supplying a soft landing when the birds fly down from the perches. Fourth, it greatly reduces the number of dirty eggs produced. If the floor is well covered a large portion of the mud carried in on the hens' feet will be removed as they walk across this litter to enter the nests.

Straw makes the best available litter, and 160 farms, or 64 per cent, were using this kind. A few farms, 5.2 per cent, were using fodder for the litter. Fodder does not absorb much of the droppings and makes hard scratching, and therefore cannot be considered as ideal. A few farms were using hay, which is not bad if it does not mold and rot, and one farm was making use of dried leaves, which can be used in the absence of straw or hay.

Table VIII further shows the manner of handling the flocks during the winter months. The ideal way to handle birds at this time of year is to house the pullets about two weeks before they start to lay and then keep them shut up until late spring. If birds so confined are not overcrowded in the house, that is, not more than 100 birds to 350 square feet of floor space, they will soon become accustomed to their quarters and will not be bothered by outside weather changes. This steady comfort and uniform treatment will cause a higher egg production than when the birds are on range, especially since it is possible to force them for greater production by feeding more mash in proportion to the grain and perhaps by the use of artificial lighting. Pullets which have been forced and confined all winter do not generally produce strong hatching eggs in the spring. They are the money producers of the winter and should not be considered as breeders.

The old hens which have been left after culling should be used as breeders. Since their winter production is never high anyway, it is well to let them out on range all winter, providing a warm shelter for bad weather. Thus while the pullets are making the cash returns the hens are building up vigor and will lay strong hatching eggs when they are needed in the spring.

People who have kept records and those farms which make poultry their only business instead of a side-line, have found that the above system of winter management, is best. This survey showed that only two farms were practicing this method. Most of the farms, 79.2 per cent, were permitting both the hens and pullets to have free range

A POULTRY SURVEY IN KANSAS

31

except in bad weather. On stormy days all the birds were crowded into a house with inadequate capacity (Table III) and there, under the discomfort of confinement and the damaging effects of overcrowding, the egg production dropped. Almost every farm reported that the egg production fell after such confinement.

A few farms were keeping pullets only and these were confined all winter. Others practiced this with hens only. Such farms will get winter eggs but will have poor hatching eggs in the spring. Those who sell a large number of hatching eggs should not force winter eggs from spring breeders, but where farmers buy their baby chicks and do not need hatching eggs they can force their entire flock for winter production.

It is interesting to note who cares for the poultry on the farm. The housewife leads, for Table VIII shows that she did the work on 72.4 per cent of the farms, and the rest of the family helped in a few instances.

The most surprising thing in Table VIII is the small number of farms keeping records on their poultry. Only 5.6 per cent of the farms were keeping feed records, and 12.4 per cent egg records. How the others can tell whether their poultry is profitable or not is quite a mystery.

FEEDING PRACTICES

Table IX gives in detail the feeding practices found on this survey. Most farms, 87.2 per cent, were feeding their flocks all year, although 12.8 per cent of them were not feeding anything to their poultry during the late summer and fall months, but expected the birds to forage and make out their existence from the waste grains on the farm. It is questionable whether such practice is profitable, as egg production and growth of young stock is seriously retarded under such conditions and this retarding is often more costly than the feed saved. If a good egg mash or growing mash is always present to supplement the grains foraged, then no loss of growth or egg production will result, and the waste grains also will be saved.

All of the farms feeding their poultry throughout the entire year fed grain. Most farms were feeding this grain on the bare ground, as only 28 per cent were feeding it in the litter and 4 per cent were feeding it in hoppers or troughs. Since some farms fed the grain in the litter only during the winter, there were 93.2 per cent of them that were feeding on the bare ground (fig. 8) at some time of the year. Such a practice forces the birds to eat the filth and droppings

TABLE VIII.—Management of flocks.

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
USE OF LITTER IN HEN HOUSES:												
Litter used all year.....	7	14	2	4	7	14	5	10	3	6	24	9.6
Litter used in winter.....	31	62	26	52	32	64	39	78	34	68	162	64.8
No litter used.....	12	24	22	44	11	22	6	12	13	26	64	25.6
Totals.....	50	100	50	100	50	100	50	100	50	100	250	100
Straw used as litter.....	30	60	19	38	34	68	41	82	36	72	160	64.0
Fodder used as litter.....	2	4	9	18			1	2	1	2	13	5.2
Hay used as litter.....	6	12			4	8	2	4			12	4.8
Leaves used as litter.....					1	2					1	.4
FLOCK MANAGEMENT DURING WINTER:												
Hens and pullets on free range.....	29	58	48	96	42	84	35	70	44	88	198	79.2
Hens and pullets confined.....	5	10	2	4	2	4			5	10	14	5.6
Pullets on free range.....	6	12			1	2	12	24			19	7.6
Pullets confined.....	2	4			2	4					4	1.6
Hens on free range.....	5	10			2	4	3	6	1	2	11	4.4
Hens confined.....	1	2									1	.4
Pullets confined, hens on free range.....	1	2			1	2					2	.8
Hens confined, pullets on free range.....	1	2									1	.4
Totals.....	50	100	50	100	50	100	50	100	50	100	250	100
PERSONS CARING FOR THE POULTRY:												
Wife.....	31	62	38	76	33	66	40	80	39	78	181	72.4
Wife and husband.....	12	24	6	12	12	24	6	12	6	12	42	16.8
Husband.....	2	4	5	10	2	4	3	6	3	6	15	6.0
Daughter.....	2	4			1	2			1	2	4	1.6
Wife and son.....	1	2	1	2	1	2	1	2			4	1.6
Wife and daughter.....	1	2							1	2	2	.8
Husband and daughter.....					1	2					1	.4
Son.....	1	2									1	.4
Totals.....	50	100	50	100	50	100	50	100	50	100	250	100
PER CENT OF FARMS KEEPING FEED RECORDS:	6		8		4		6		4		5.6	
PER CENT OF FARMS KEEPING EGG RECORDS:	10		8		14		24		6		12.4	

TABLE IX.—Feeding practices.

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
MANNER OF FEEDING:												
Poultry fed all year.....	47	94	50	100	48	96	44	88	29	58	218	87.2
Poultry not fed all year.....	3	6			2	4	6	12	21	42	32	12.8
Totals.....	50	100	50	100	50	100	50	100	50	100	250	100
FEEDING OF GRAIN:												
Grain fed all year.....	47	94	50	100	48	96	44	88	29	58	218	87.2
Grain fed on bare ground or floor.....	48	96	49	98	46	92	48	96	42	84	233	93.2
Grain fed in litter.....	19	38	18	36	14	28	3	6	16	32	70	28.0
Grain fed in troughs or hoppers.....	3	6	2	4	1	2	2	4	2	4	10	4.0
Kafir fed.....	32	64	45	90	47	94	30	60	39	78	193	77.2
Yellow corn fed.....	47	94	31	62	41	82	37	74	4	8	160	64.0
White corn fed.....	17	34	33	66	24	48	27	54	16	32	117	46.8
Wheat fed.....	7	14	9	18	7	14	40	80	10	20	73	29.2
Oats fed.....	21	42	3	6	12	24	2	4	1	2	39	15.6
Milo fed.....					1	2	2	4	35	70	38	15.2
Barley fed.....							2	4	7	14	9	3.6
Cane fed.....							1	2	5	10	6	2.4
Buckwheat, feterita, pop corn and others.....	1	2					5	10	1	2	7	2.8
Cod-liver oil fed.....	4	8	6	12	8	16	3	6	1	2	22	8.8
FEEDING OF MASH:												
Mash fed all year.....	17	34	18	36	19	38	13	26	9	18	76	30.4
Mash fed during fall and winter.....	10	20	12	24	16	32	16	32	16	32	70	28.0
Mash fed dry.....	23	46	23	46	29	58	20	40	15	30	110	44.0
Mash fed wet.....	4	8	7	14	6	12	9	18	10	20	36	14.4
Sufficient protein in mash.....	18	36	22	44	24	48	14	28	11	22	89	35.6
FEEDING OF MILK:												
Milk fed to poultry.....	40	80	38	76	42	84	39	78	40	80	199	79.6
Fed in clabber form.....	38	76	32	64	31	62	31	62	19	38	151	60.4
Fed sweet.....	1	2	6	12	9	18	8	16	20	40	44	17.6
Fed as buttermilk.....					1	2			1	2	2	.8
Fed baked.....	1	2									1	.4
Fed as cottage cheese.....					1	2					1	.4

TABLE IX.—*Concluded.*

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
FEEDING OF GREEN FEED:												
Green feed fed during winter.....	42	84	13	26	28	56	39	78	28	56	150	60.0
Alfalfa hay.....	38	76	6	12	23	46	38	76	24	48	129	51.6
Pasture forage.....	4	8	4	8	3	6	1	2	2	4	10	4.0
Sprouted grain.....	2	4	2	4	2	4			1	2	7	2.8
Tubers.....	2	4	1	2					1	2	4	1.6
WATER WARMED IN WINTER.....	37	74	37	74	41	82	41	82	39	78	195	78.0
FEED COOKED IN WINTER.....	9	18	11	22	5	10	20	40	20	40	65	26.0



FIG. 8.—(I) An attractive flock of Rhode Island Whites. The little chicks, however, had a slim chance of getting their portion of grain when they had to compete with mature stock. The "chick creep" provided in (II) prevented interference by the adult stock. The size and sturdy qualities of the young stock indicated that it had been well fed.

and is one source of disease infection. Ground feeding also encourages the sparrows which are a source of more trouble to poultry than is realized.

Kafir was fed on 77.2 per cent of the farms visited and was the most popular feed found. This grain is a good poultry feed if not fed in a moldy or musty condition, but it lacks the necessary vitamin A found in yellow corn, which was fed on 64.0 per cent of

the farms. Yellow corn in the ration is a good preventive of nutritional roup. White corn, fed on 46.8 per cent of the farms, does not contain vitamin A, and therefore these flocks are in danger of contracting nutritional roup if the ration is not supplemented with a green feed or green feed substitute. The popularity of the other grains will be noted in Table IX.

Since many farms were not feeding yellow corn it is interesting to note what practices were employed to supply vitamin A. Cod-liver oil was fed on 8.8 per cent of the farms, and green feed was furnished during the winter months on 60 per cent of the farms. Since bright green alfalfa hay is probably the best, green feed substitute for poultry, and the most easily available in Kansas, it was gratifying to note that 51.6 per cent of the farms were feeding it. If every farm not feeding yellow corn would keep a plentiful supply of green, well-cured alfalfa leaves always available much winter roup would be prevented.

It is a known fact that poultry cannot produce any great amount of eggs from grain feeds alone, yet only 30.4 per cent of the farms were feeding an egg mash the entire year, and 28 per cent were feeding it during the fall and winter. Of these farms only 35.6 per cent had sufficient protein in their eggs mash. The rest were feeding nothing but bran, shorts, and ground grains, which alone will not supply a balanced ration. This lack of egg mash was offset in some degree in that 79.6 per cent of the farms were feeding some form of milk. If the milk were available at all times of the year, and if enough of it could be given to the chickens (three gallons per 100 hens daily), an egg mash would not be so necessary, as milk would supply the needed protein. Since most farms did not have either enough milk, or did not have it all the year, the lack of a good protein egg mash is no doubt one reason for the low average egg production of the Kansas hen.

Water makes up approximately two-thirds of the egg, and a frozen water bucket is a factor contributing to a low winter egg yield. It was gratifying to note that 78 per cent of the farms were warming water for the chickens during the winter months. About one-fourth of the farms, 26 per cent, were cooking the poultry feed in winter. Cooking feed with one or two exceptions, such as potatoes and carrots, lowers its digestibility and it is doubtful whether this cooking practice was helping matters.

Kansas farmers can best improve their feeding methods by supplying a good mash the year around, to both young stock and lay-

A POULTRY SURVEY IN KANSAS 37

ing hens, and by seeing that, green alfalfa hay or alfalfa leaves are always available during the winter, especially if yellow corn or green feeds other than alfalfa are not included in the ration.

BREEDING

Table X gives the breeding practices employed on the farms covered in this survey. There were two methods of disposal for the hatching eggs produced. Some were set at home and others were sold to either private parties or hatcheries. Just one-third of the farms, 33.2 per cent, were selling hatching eggs for private settings, while only 3.6 per cent were selling eggs to commercial hatcheries.

It, was surprising to note that more than one-third of the farms visited were not culling their flocks. Those that were culling did the work themselves, in most cases, although professional cullers, county agricultural agents, or state inspectors culled 9.2 per cent of the flocks. The 96 farms, or 39.4 per cent, that were not culling their hens were not taking advantage of the usual and effective method of improving the female side of their breeding stock. Instead of raising the quality of their stock year by year these farms were only holding their own or else slipping backward in both egg production and standard-bred qualities. The hens represent one-half of the breeding unit and should be culled and selected as carefully as the males.

A few farms were not producing hatching eggs, but were buying either their eggs or chicks. Consequently these farms, 2.8 per cent, were not using male birds. The balance of the farms, 97.2 per cent, were producing hatching eggs, and over half of these, 52.4 per cent, were buying their breeding males as grown birds. One-fourth of them, 25.2 per cent were buying eggs and using the males reared from them. Ten per cent were trading males with their neighbors, and the rest were using males from their own breeding.

Male birds comprise in reality only one-half of the breeding flock, but oftentimes the male is considered of more importance in poultry breeding than the female, as a single individual affects so many more progeny than does a female. Therefore it is essential that great care be used in selecting the breeding males. The average farm is too negligent concerning this important fact. Using males of one's own breeding should be practiced with caution, only those individuals being used which show strong vigor. Even then new blood should be introduced every few years. The policy of trading with a neighbor, or at the produce house, will seldom improve the flock. Even the buying of new males or eggs to produce breeders is

TABLE X.—Breeding.

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
SELECTION OF FEMALES:												
Flocks culled by owners.....	29	58	13	26	27	54	33	66	29	58	131	52.4
Flocks culled by professional cullers.....	1	2	1	2	5	10	5	10	1	2	13	5.2
Flocks culled by county agricultural agents.....	2	4	4	8			2	4			8	3.2
Flocks culled by state inspectors.....			2	4							2	.8
Total of flocks culled.....	32	64	20	40	32	64	40	80	30	60	154	61.6
SELECTION OF MALES:												
Males purchased as grown birds.....	22	44	21	42	31	62	37	74	20	40	131	52.4
Males raised from eggs bought.....	16	32	12	24	7	14	8	16	20	40	63	25.2
Males traded with neighbors.....	1	2	8	16	7	14	2	4	7	14	25	10.0
Males used from own breeding.....	9	18	7	14	5	10	3	6			24	9.6
No males used.....	2	4	2	4					3	6	7	2.8
Totals.....	50	100	50	100	50	100	50	100	50	100	250	100
HATCHING EGGS SOLD:												
To private parties.....	18	36	9	18	17	34	20	40	19	38	83	33.2
To hatchery operators.....	3	6	4	8					2	4	9	3.6
Total hatching eggs sold.....	21	42	13	26	17	34	20	40	21	42	92	36.8

A POULTRY SURVEY IN KANSAS

39

a questionable practice, unless one is absolutely certain they come from a flock of superior breeding. The best breeding males are from pedigreed flocks, and it is well to demand a dam's record of over 200 eggs per year when purchasing males.

DISEASES AND PARASITES

Cleanliness is one of the prime essentials in successful poultry farming. The unit value of the chicken is too small to make individual treatment for disease profitable, and the value of most remedies as a complete cure is questionable in most cases. Therefore the logical and most successful way to combat poultry parasites and diseases is to practice preventive methods that will keep the flock free from such damaging ills. The best preventive measure is cleanliness,

Table XI shows in detail the sanitary methods employed on the farms visited. Clean houses are a part of a preventive program, and it will be remembered that a large number of farms had dirt floors in the poultry house and did not use droppings boards to help keep the droppings from contaminating the floor soil. (Tables III and IV.) Most farms, however, were taking some precautions against mites, as only 28 farms, or 11.2 per cent., were making no fight against this parasite. The most common disinfectant employed was ordinary stock dip, which is very effective. Creosote, carbolic acid or phenol, carbolineum, gasoline, and kerosene were all used to combat mites, although some seem to be more thorough than others. Some farms were using crank-case oil or crude oil, the value of which is questionable. Salt and ashes and whitewash were used by a few farms, but these materials are not at all effective against mites. Except for manure-filled dirt floors, the cleanliness of most poultry houses visited was fairly satisfactory.

The second point of a preventive program is clean birds. Perhaps some farms are never bothered with parasites on their birds, but from general observations these are the exceptions rather than the rule. In spite of this fact there were 106 farms, or 42.4 per cent, that were giving their flocks no treatment for lice. Many of these flocks plainly showed the presence of lice, and better results would have been obtained had these parasites been eliminated.

Commercial louse powders were being used on 70 farms or 28 per cent. Such a powder, if properly made, offers good protection at certain times of the year, although it is not as thorough or efficient as the sodium fluoride powder or the sodium fluoride dip. This chemical is considered the most efficient of all treatments, es-

TABLE XI.—Diseases and parasites.

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
TREATMENT FOR MITES:												
Stock dip, paint and spray.....	19	38	12	24	19	38	10	20	11	22	71	28.4
Crank-case oil paint and spray.....	5	10	7	14	10	20	10	20	17	34	49	19.6
Creosote paint and spray.....	8	16	5	10	1	2	15	30	2	4	31	12.4
Kerosene paint and spray.....	3	6	6	12	5	10	3	6	10	20	27	10.8
Carbolic acid paint and spray.....	4	8	2	4	9	18	5	10	1	2	21	8.4
Carbolineum paint and spray.....			11	22							11	4.4
Whitewash paint.....	1	2	1	2			3	6	3	6	8	3.2
Salt and ashes.....	1	2			2	4					3	1.2
Gasoline.....							1	2			1	.4
No treatment.....	9	18	6	12	4	8	3	6	6	12	28	11.2
Totals.....	50	100	50	100	50	100	50	100	50	100	250	100
TREATMENT FOR LICE:												
Commercial louse powder.....	15	30	8	16	12	24	23	46	12	24	70	28.0
Sodium fluoride dip or dust.....	12	24	9	18	13	26	13	26	12	24	59	23.6
Grease (lard and blue ointment).....	1	2	1	2			1	2	3	6	6	2.4
Stock dip.....	1	2	2	4	1	2					4	1.6
Sulphur dust.....	1	2	1	2					1	2	3	1.2
Salt water or homemade powder.....	1	2							1	2	2	.8
No treatment.....	19	38	29	58	24	48	13	26	21	42	106	42.4
Totals.....	50	100	50	100	50	100	50	100	50	100	250	100
CONDITIONS SANITARY.....	15	30	11	22	11	22	13	26	20	40	70	28.0
INDICATIONS OF DISEASE.....	21	42	33	66	10	20	14	28	18	36	96	38.4

A POULTRY SURVEY IN KANSAS

41

pecially the dip method, and was being used on 23.6 per cent of the farms. Greasing with lard and blue ointment was practiced on a few farms, but this method is gradually losing favor since it, is not as efficient as the sodium fluoride. A few farms were dipping their birds in stock-dip solution. This is usually harmful to the birds and imparts an odor to the flesh that prevents the sale of any fowl for table purpose for a long time. Salt water and sulphur dust were also being used. Neither of these is effective in controlling lice.

The last two points of a preventive campaign are clean ranges and clean feed. Conditions appeared sanitary on only 28 per cent of the farms visited. Nearly three-fourths of the farms had their birds ranging on bare ground covered with filth. As mentioned before (Table IX) 93.2 per cent of these same farms were feeding the grain upon filthy ground, thus polluting the feed to a certain extent, and breaking a rule in disease prevention.

Considering the conditions just enumerated it is not surprising to note in Table XI that 38.4 per cent of the farms either had had a disease outbreak earlier in the spring or were experiencing one at the time of the survey. Kansas poultry raisers can greatly increase their efficiency by improving the sanitary conditions of their premises.

MARKETING

It is interesting to note the various channels through which the surplus eggs of Kansas are carried to the consumer. Table XII shows that 126 farms, or 50.4 per cent, were selling their eggs to local produce houses. Nearly as many, 107 farms, or 42.8 per cent,, were selling their eggs to local grocery stores. Ten farms, 4 per cent, were selling their eggs to private customers and 2 farms were shipping to distant markets. Five farms were not selling any but were producing only for home consumption.

It was surprising to note the large number who sold their eggs to grocery stores. Usually the best price is not obtained by such marketing, and since most country stores are not equipped with refrigeration facilities for storing eggs until shipping, it certainly is not the best method of marketing to uphold the quality of the fresh egg in the summer time. Especially is this true of fertile eggs, which in hot weather very rapidly undergo sufficient development to produce blood rings.

Table XII further shows that only about one-fourth, 26.8 per cent of the farms were keeping the male birds away from the flocks

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
MARKETING EGGS:												
Eggs sold to local produce houses.....	33	66	29	58	26	52	30	60	8	16	126	50.4
Eggs sold to local grocery stores.....	8	16	21	42	24	48	15	30	39	78	107	42.8
Eggs sold to private customers.....	6	12					2	4	2	4	10	4.0
Eggs shipped to market.....	2	4									2	.8
Not selling eggs—using all at home.....	1	2					3	6	1	2	5	2.0
Totals.....	50	100	50	100	50	100	50	100	50	100	250	100
PRODUCTION OF QUALITY EGGS:												
Producing infertile eggs during summer.....	14	28	15	30	15	30	13	26	10	20	67	26.8
Sufficient nests to prevent breakage.....	43	86	20	40	42	84	40	80	30	60	175	70.0
Nests well located to prevent breakage.....	17	34	15	30	27	54	26	52	26	52	111	44.4
Nests covered to produce clean eggs.....	27	54	11	22	27	54	26	52	15	30	106	42.4
Nesting material used to produce clean eggs.....	44	88	25	50	46	92	45	90	25	50	185	74.0
Broody coops used to prevent heating of eggs.....	33	66	24	48	36	72	39	78	18	36	150	60.0
MARKETING POULTRY:												
Birds sold to local produce house.....	36	72	34	68	38	76	42	84	45	90	195	78.0
Birds sold to local grocery stores.....	4	8			12	24	1	2			17	6.8
Birds sold dressed to private customers.....	6	12					5	10	3	6	14	5.6
Birds shipped to distant market.....			1	2							1	.4
No birds sold—eaten at home.....	4	8	15	30			2	4	2	4	23	9.2
Totals.....	50	100	50	100	50	100	50	100	50	100	250	100

TABLE XII.—*Concluded.*

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
FATTENING BIRDS BEFORE SELLING:												
Pen fattened on grain and milk	16	32	10	20	14	28	17	34	4	8	61	24.4
Crate fattened on soft milk feed	2	4	2	4	1	2			1	2	6	2.4
Totals	18	36	12	24	15	30	17	34	5	10	67	26.8
TYPE OF BIRDS FATTENED:												
Hens	12	24	8	16	11	22	16	32	2	4	49	19.6
Broilers	11	22	7	14	9	18	8	16	5	10	40	16.0
Males	2	4									2	.8
Capons					1	2					1	.4
FREQUENCY OF MARKETING DURING SPRING AND SUMMER	1.8 times a week		1.8 times a week		1.6 times a week		1.3 times a week		1.4 times a week		1.6 times a week	
FREQUENCY OF MARKETING DURING FALL AND WINTER	1.1 times a week		1.0 times a week		1.1 times a week		1.0 times a week		1.2 times a week		1.1 times a week	

during the summer months. This means that the major portion of Kansas eggs are fertile and are subject to spoilage during the summer months by the process of incubation brought about by the heat of this season. Infertile eggs should be produced after June 1 and the country buyers should store eggs under refrigeration. The lack of these two practices is one cause for discrimination against middle-western eggs.

The producer should not hold his eggs at home too long before selling. Table XII shows that the farms were selling their eggs on the average of 1.6 times each week during the spring and summer and 1.1 times a week during fall and winter. This is not a bad average if the eggs are properly cared for while being held. Exposure to heat, dampness, drying winds, and strong odors very rapidly lowers the quality of eggs. The sooner an egg gets under refrigeration the better it is for consumer and producer alike.

Often times the value of otherwise good eggs is lowered by improper conditions in the poultry house. Dirty eggs are lowered materially in selling value. As has been pointed out under "Management of Flocks," a great many dirty eggs could be prevented by providing clean litter in the henhouse. In addition to this, if a little care is given to the nests still fewer eggs will become stained by manure or from broken eggs in the nests. Hens that have to crowd into nests are apt to break eggs, especially if no nesting material is provided or the nests are poorly located so that there is too much light and not enough seclusion. Sufficient nests were provided on 70 per cent of the farms, and nesting material was furnished on 74 per cent of the farms. Nests were covered so as to keep out droppings on only 42.4 per cent of the farms, while only 44.4 per cent had their nests well located in secluded parts of the henhouse.

Coops for broody hens were provided on 60 per cent of the farms. Even if all of these were used there would still be 40 per cent of the farms obtaining heated eggs from broody hens remaining on the nests. Much improvement in the market quality of the Kansas egg could be brought about by improving the arrangement of the nests in the poultry houses.

Most of the live poultry sold was to the produce house, as 76 per cent of the farms were so marketing. The grocery stores bought poultry from 6.6 per cent of the farms, and 5.6 per cent were dressing their birds and selling to private customers. Only one farm was shipping its poultry to distant markets. It was interesting to note that 9.2 per cent of the farms were not selling any poultry, but were eating their entire supply at home.

The statement has been made that too many farms were fattening their poultry on a soft mash feed before selling. Birds thus fattened on the farm do not respond well to the fattening methods of the produce house, and if this practice was extensive it would be a material cause for lower prices. This survey, however, showed that only 2.4 per cent of the farms were fattening on soft milk feed and that most of these were the ones that were dressing their birds for private customers. About one-fourth of the farms, 24.4 per cent, were fattening their birds on whole or cracked grains and milk before selling. This system of fattening is not detrimental to produce-house practices. This leaves the largest bulk of the farms, 73.2 per cent, that make no effort to fatten their poultry before selling.

Hens were fattened on 19.6 per cent of the farms; broilers on 16 per cent; and males and capons on 0.8 and 0.4 per cent respectively.

MISCELLANEOUS INFORMATION

Table XIII contains miscellaneous information that is very interesting. Most of the farms visited, 83.6 per cent, considered their poultry operations profitable, while only 28 farms, or 11.2 per cent, considered them unprofitable. A few farms, 5.2 per cent, were in doubt as to whether their poultry was profitable or not. Since it has been shown before (Table VIII) that only 5.6 per cent of the farms were keeping feed records, and only 12.4 per cent of them were keeping record of their egg production, the question naturally arises as to the accuracy of the above considerations. Without any definite cost-and-income figures it is difficult to arrive at correct conclusions with regard to profit. An effort was not made to get the average annual egg production, as so few kept records. The estimated production is available in the government census figures.

Most farms attributed the source of their poultry information to practical experience. By this was meant the working out of their present management routine by the successes and failures of past efforts. The sources of most new ideas that were tried out undoubtedly were obtained either directly or indirectly from farm papers and poultry journals, the Kansas State Agricultural College, radio talks and lectures, the United States Department of Agriculture, the county agricultural agent, and correspondence courses. The farms visited attributed credit to these various sources of information in the order named above. Since four of the ten counties visited did not have an agricultural agent, the results

TABLE XIII.—Miscellaneous information.

	District 1		District 2		District 3		District 4		District 5		All Farms	
	Farms		Farms		Farms		Farms		Farms		Farms	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
PROFITABLENESS OF POULTRY RAISING:												
Farms considering poultry profitable.....	43	86	48	96	45	90	38	76	35	70	209	83.6
Farms considering poultry unprofitable.....	6	12	1	2	5	10	9	18	7	14	28	11.2
Farms doubtful as to profits.....	1	2	1	2			3	6	8	16	13	5.2
SOURCE OF POULTRY INFORMATION:*												
Practical experience.....	45	90	25	50	32	64	46	92	22	44	170	68.0
Poultry journals and farm papers.....	24	48	10	20	42	84	35	70	35	70	146	58.4
Kansas State Agricultural College.....	14	28	22	44	16	32	22	44	14	28	88	35.2
Radio talks and lectures.....	14	28	8	16	10	20	14	28	1	2	79	31.6
United States Department of Agriculture.....	10	20	2	4	8	16	19	38	12	24	51	20.4
County Agricultural Agent.....	2	4	11	22	1	2	3	6	8	16	25	10.0
Correspondence courses.....	1	2			1	2					2	.8
Average number per farm of poultry killed annually by auto.....	6 birds		10 birds		9 birds		9 birds		12 birds		9.2 birds	

* Many farms reported information received from more than one source.

A POULTRY SURVEY IN KANSAS

47

recorded in Table XIII perhaps do not show this source of help in its full significance. The per cent of farms receiving help from this source is practically cut in half in each district by the nonagent county included.

This survey showed an average of 9.2 birds per farm killed each year by autos. The writers consider this a fair estimate for the entire state, as both well-traveled main highways and lesser traveled side roads were included in this survey. If this is near the average per farm for the state, then the total number of poultry killed by autos each year for the state of Kansas would be 1,526,087. Of these most are chickens, ranging in age from broilers to mature fowls, while many are turkeys, ducks, and geese. It is difficult to estimate accurately the unit value of these, but 75 cents each would probably not be far wrong. At this figure the annual money loss from poultry killed on Kansas highways would be \$1,144,565.25.

The heaviest loss occurs during the summer months when many flocks are not fed and when they are attracted to the grain scattered in the roads at threshing time. The heavy Sunday auto traffic also takes a large toll. Many were found to be reducing this loss by fencing the chickens out of the road, feeding more liberally, and selecting the more agile breeds. Confining the flock on Sunday, when the traffic is heaviest, would also cut down this loss.

SUMMARY

This survey was a good demonstration of the general interest and faith in poultry production. An earnest effort is being made by the majority of farmers to improve conditions, use better methods, and to invest more and expect greater returns from the farm flock. Farmers in general were found to be fairly well posted on modern methods of keeping poultry, and when they were not practicing all that they knew there were usually good reasons for not doing so. Lack of working capital, occupying rented farms, and insufficient time or help were adequate reasons for many of the conditions found.

The common tendency to keep more stock or rear more chicks than there were housing or brooding facilities to accommodate was found in all districts. Adapting the numbers to the equipment would mean less loss and greater return from the birds kept.

As to the future needs for further improvements we would recommend better equipment, better stock, and the employment of the best-known methods of management, particularly as relates to the

use of clean ground for rearing chicks and the feeding of both grain and mash through the year.

The authors are convinced that, it is not more chicks and larger flocks that Kansas needs, but it is lower mortality of chicks hatched and greater production from hens kept that should engage the attention of producers in the future. Those who have learned the secret of economic production will survive longest and find poultry raising profitable.

PUBLICATIONS ON POULTRY

Other recent publications of the station dealing with various phases of poultry husbandry include the following:

Cir. No.

- 27 Capons for Kansas. By Wm. A. Lippincott. (8 pp., 7 illus.)
- 99 Poultry Breeding Records. By Wm. A. Lippincott. (34 pp., 24 illus.)
- 106 Prevention and Control of Poultry Diseases. By L. D. Bushnell and W. R. Hinshaw. (78 pp., 25 illus.)
- 122 Poultry Management on the Farm. By Loyal F. Payne. (50 pp., 19 illus.)
- 127 Fitting and Exhibiting Standard-Bred Poultry. By H. H. Steup. (37 pp., 17 illus.)

Copies of any of these publications in which the reader may be interested may be secured as long as available by addressing a request to: AGRICULTURAL EXPERIMENT STATION, MANHATTAN, KAN.

APPENDIX

POULTRY PRODUCTION QUESTIONNAIRE

The questions listed below were used in securing the information reported in this bulletin.

Draw line under suitable word

- Date..... No.....
 1..... County.....
 Name and address
2. (a) Breed and varieties of chickens.....
 crossbred, mongrel.
 (b) Type of flock: Not graded, certified, accredited, or demonstration
 farm flock.
 (c) Quality: Good, medium, poor.
 (d) Other breeds: Turkeys, guineas, ducks, and geese.
3. (a) Size of farm.....acres.
 (b) Type of farming followed: General, grain, dairy, live stock, poultry,
 potato, fruit, market gardening.
 (c) Is farm owned, rented, or leased?
4. Number of birds November 1, 1925: Pullets.....; hens.....; males.....;
 capons.....

HOUSES

5. (a) Number of laying houses.....; size.....
 (b) Number of brooder houses.....; size.....
 (c) Type of roof on laying houses: Shed, gable, semimonitor, uneven span.
 (d) Material used: Roofing paper, shingles, sheet iron, straw.
 (e) Wall construction: Wood, tile, sheet iron, straw.
 (f) Year built.....
6. (a) Open front: Yes or no.
 (b) Proportion of front wall open: $\frac{1}{3}$; $\frac{1}{4}$; $\frac{1}{5}$; or
 (c) Number of glass windows in front.....
 (d) Size..... Ends..... Rear.....
 (e) Glass substitutes: Yes, no. Number of windows..... Size.....
7. (a) Is loft used: Yes, no.
 (b) Type: Straw, fodder, hay, boards.
 (c) How long in use without changing materials.....
 (d) Pests in loft: Rats, mice, sparrows, mites.
8. Kind of floor: Dirt, oiled, wood, concrete, tile, gypsum, others.
9. (a) Litter used: All year, summer, winter, none at all.
 (b) Kind: Straw, fodder, hay, shavings, commercial.
10. Are droppings boards used? Yes, no.
11. (a) Are a sufficient number of nests available? Yes, no.
 (b) Are nests well located? Yes, no.
 (c) Are they covered? Yes, no.
 (d) Is nesting material used? Yes, no.
 (e) Are broody coops used? Yes, no.
12. (a) Is an attempt made to control mites? Yes, no.
 How.....

- (b) Is an attempt made to control lice? Yes, no. How.....
13. Is mash hopper provided? Yes, no.
14. Winter care:
- (a) Hens: Confined, free range.
- (b) Pullets: Confined, free range.
- (c) Hens and pullets: Confined, free range.
- (d) Do you provide dust baths? Yes, no.

FEEDING FOR EGG PRODUCTION

15. (a) Is there a period during the year when poultry is not fed? Yes, no.
Months.....
16. (a) Is grain fed throughout the year? Yes, no.
(b) In litter, in hoppers, on bare ground, bare floor.
17. (a) Is mash fed throughout the year? Yes, no. When: Fall, winter, spring, summer.
(b) Method: Dry, wet.
18. Does mash contain sufficient protein supplement: Yes, no.
19. (a) Is milk fed: Yes, no.
(b) As a beverage, clabber, cottage cheese, dry, condensed buttermilk.
20. (a) Do you keep feed records? Yes, no.
(b) Do you keep production records? Yes, no.
(c) Egg production per hen per year.....
(d) How many chickens are killed by autos annually?
21. (a) Is green feed supplied in winter? Yes, no.
(b) Kind: Wheat or rye pasture, sprouted grain, cabbage, tubers, alfalfa leaves.
22. Do you feed codliver oil? Yes, no.
23. Type of grain fed: Yellow corn, white corn, wheat, kafir, milo, mixed, grain.
24. (a) Is water warmed during the winter? Yes, no.
(b) Do you cook poultry feed? Yes, no.
25. (a) Are general conditions sanitary? Yes, no.
(b) Indication of diseases: Yes, no.
26. (a) Are birds specially fattened with grain or milk ration before selling? Yes, no.
(b) Method of fattening: Pen, crate.
(c) Type of birds fattened: Broilers, hens, males, capons.
27. (a) To whom do you sell your poultry? Local poultry buyer, grocery store, ship to packer direct.
(b) To whom do you sell market eggs? Local poultry buyer, grocery store, ship to packer, ship to New York or other points.
(c) How often do you take eggs to market? Spring and summer,....., fall and winter,

BREEDING AND MANAGEMENT

28. (a) Is your flock culled each year? Yes, no.
(b) If so, by whom? Yourself, county agricultural agent, professional,

A POULTRY SURVEY IN KANSAS

51

29. (a) Do you sell hatching eggs? Yes, no.
(b) Purchaser: Hatchery operators, private parties.
(c) Do you hatch and sell baby chicks? Yes, no.
30. Breeding males: Reared, bought, trade with neighbor.
31. Do you sell or pen all male birds to produce infertile eggs during the summer (June to September)? Yes, no.

INCUBATION AND BROODING

32. (a) Method of incubation: Natural, artificial, both.
(b) Name of incubator.....capacity.....
(c) Do you have your eggs custom-hatched? Yes, no.
33. Number of chicks: Hatched.....; bought.....; total.....
34. Method of brooding: Natural, artificial, both.
35. How many chicks raised to ten weeks of age?.....
36. (a) Brooder house: Permanent, portable.
(b) Are houses moved? Yes, no.
(c) How often?
- (d) If permanent, are runs cultivated and cropped? Yes, no.
37. (a) Type of brooder: Fireless, small kerosene, electric, oil stove, coal stove, hotwater-pipe system.
(b) Number of chicks with each brooder.....
(c) Are chicks of different ages brooded together? Yes, no.
38. Do chicks under twelve weeks of age and old birds run together? Yes, no.
39. (a) Ration fed chicks: Home-mixed, commercial.
(b) Are chicks started with grain, mash, or both first week.
(c) Is milk used the first week? Yes, no. What form.....

MISCELLANEOUS

40. Who looks after the chickens? Wife, husband, son, daughter, hired hand, grandparents.
41. Do you consider poultry profitable?
42. Source of poultry information: Practical experience, K. S. A. C., county agricultural agent, radio, poultry journals, United States Department of Agriculture bulletins, correspondence courses.
43. (a) Do you know about the Kansas State Agricultural College? Yes, no.
(b) Have you ever visited K. S. A. C.? Yes, no.
When?.....

THE PROGRESS OF THE POULTRY INDUSTRY IN KANSAS, 1919 TO 1926

In order to determine the progress made in each of the counties and in each of the five districts previous to the survey, calculations were made from state and government reports and the results are shown in figure 9.

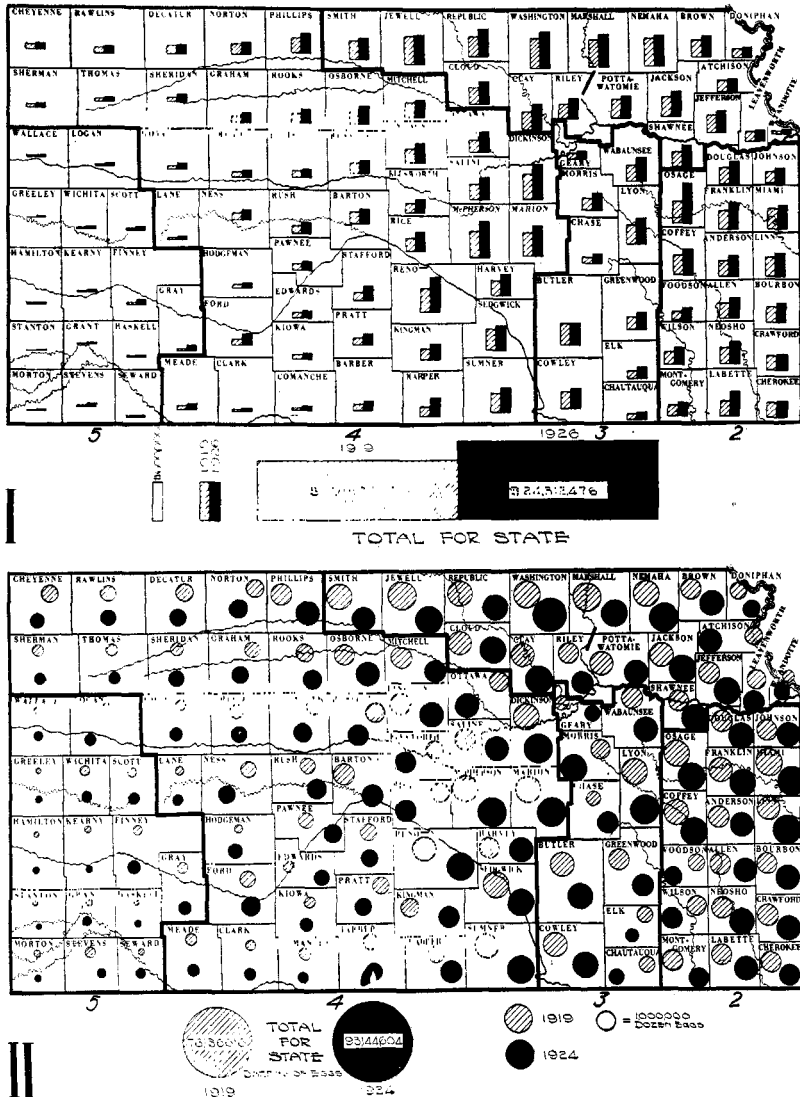


FIG. 9.—(I) Map of Kansas showing the value of surplus poultry and eggs sold by counties for 1919 and 1926. The increase over the seven-year period for the different districts was as follows: One, 23 per cent; two, 37 per cent; three, 30 per cent; four, 43 per cent; and five, 104 per cent. The entire state showed an increase of 36 per cent. (These calculations were made from figures secured from the office of the State Board of Agriculture.) (II) Map of Kansas showing the production of eggs by counties for 1919 and 1924. The increase reported for the entire state was 22.3 per cent. (These calculations were based on figures reported by the United States Agricultural Census of 1925.)