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PLANS AND OPERATIONS
OF
FARM AND SMALL COMMERCIAL
POULTRY DRESSING PLANTS

By
GEORGE A. AMACKER
and
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A study conducted with funds provided
by the Research and Marketing Act

COOPERATIVE RESEARCH AND SERVICE DIVISION
FARM CREDIT ADMINISTRATION
UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C.

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The problem of increasing marketing efficiency begins on the farm and continues through until the product actually reaches the consumer. If a farmer, individually or through his cooperative, can carry the marketing of his product through one or more processing or marketing steps more effectively than if put through other commercial channels, it is up to him to do the job.

I. W. Duggan
GOVERNOR, FARM CREDIT ADMINISTRATION

FOREWORD

The per capita consumption of poultry in the United States has increased substantially in the past 15 years. With proper processing and marketing, there is great opportunity for further increases. Increases appear more possible in or near the production areas than in the larger markets.

Production does not appear to be an important factor limiting the per capita consumption of poultry. Instead, in many areas it is the lack of widespread and year-round supplies in suitable form and of aggressive merchandising programs. On the production side the quantity of poultry produced by modern commercial practices can be increased rapidly and almost without limit. On the cost side recent developments in breeding and feeding show that poultry meat now can be produced at a lower cost than formerly in relation to that of other meats.

An important factor influencing the consumption of any product is its availability in acceptable and desired form and condition. Although both live and dressed poultry are usually available at all times in the larger cities, this often is not the case in smaller towns. With the rapid expansion of broiler production, particularly its spread beyond a small number of large intensive production areas, there has developed a need for additional small well-planned and better-operated plants to serve the producers and the smaller local markets.

The purposes of this study were to obtain first-hand information on poultry dressing at a number of the better small plants operated by poultry producers and by small poultry dressers and to suggest plant and equipment layouts. Little helpful information has been available relative to the facilities and operations of poultry dressing plants, particularly of the farm and small commercial plants. Poultry producers, local cooperatives, cold storage locker plant operators, and others are interested in or concerned with dressing small volumes of poultry. They want information which will be helpful to them in starting dressing operations or in improving present operations. In response to this specific need, the Farm Credit Administration, in cooperation with the Bureau of Plant Industry, Soils and Engineering, made this study with funds provided under the Research and Marketing Act of 1946.

Harold Hedges
CHIEF, COOPERATIVE RESEARCH AND SERVICE DIVISION

SUMMARY

The Farm Credit Administration, in cooperation with the Bureau of Plant Industry, Soils, and Agricultural Engineering, made a study of the layouts, equipment, and operations of 48 small poultry dressing plants in 10 States in the northeastern quarter of the United States, extending from Indiana to New Hampshire.

Some regional differences in dressing poultry were observed among the plants. In the Northeast poultry is generally slack-scalded and chilled before drawing. In the North Central plants somewhat higher scalding temperatures are used and poultry is often plumped and drawn warm.

Only 13 of the 48 plants had been in operation less than 6 years. The average period of operation of the 25 farm plants was 12.7 years and 22.7 years for the 23 small commercial plants.

The total investment in 8 of 41 plants was less than \$1,000. The average investment in 20 farm plants was \$4,329 and in 21 small commercial plants, \$10,416.

The average output of the farm plants was 88 New York dressed birds per hour with a range among 25 farm plants of 20 to 400 birds. The small commercial plants had an output from 40 to 400 birds per hour. The average was 131 birds per hour.

Nearly all the small plants studied, except the turkey plants, operated 46 to 52 weeks of the year. However, the farm plants average only 2.1 days per week and 7.5 hours per week. The small commercial plants operate an average of 4.8 days per week and 26.9 hours per week.

Many of the plants are strictly family operations requiring no outside or hired workers. None of 20 farm plants dressing chickens chiefly use more than 7 workers and only one of 23 small commercial plants uses more than 11 workers. The average number of workers was 3.8 at farm plants and 6.0 at small commercial plants.

Most of the plants dress several types of poultry. In nearly half of the plants 80 percent or more of the poultry dressed was young chickens - broilers, fryers, and roasters. All plants except 7, of which 4 are exclusively turkey plants, dressed some fowl.

Half of the plants sold no New York dressed poultry but 6 plants sold their entire volume New York dressed. Nearly two-thirds of the plants did some drawing and more than one-third drew all the poultry killed. Practically all the poultry was sold fresh-killed. A few plants, which prepared ready-to-cook poultry, sold some of the output frozen and a small number occasionally froze surpluses and carry-overs.

Nineteen farm plants show a slightly larger average output per-worker per-hour of New York dressed poultry than the average 11 large poultry

dressing plants previously studied by the Farm Credit Administration. Fifteen small commercial dressing plants showed an average output per-worker-hour 60 percent greater than the 11 large plants.

A number of factors enable small plants to have greater labor efficiency than large plants, despite smaller volume and the use of less mechanized equipment. Among these are (1) less idle and unproductive time, (2) greater skill and experience of workers used, (3) greater diligence of workers, and (4) less administrative time.

Although generally recognized that higher scalding temperatures enable workers to increase their output, in this study no direct relationship was found between the scalding temperatures used and the per-man-hour output. This apparent lack of relationship is probably due to the fact that the differences in scalding temperature were offset by other factors which affect labor efficiency.

The wide variation in production per worker among 34 individual small plants studied and between the farm and small commercial plants appears due to (1) plant layout, (2) type and condition of equipment, (3) skill of picker and thoroughness of picking job, (4) skill of pinners, (5) completeness and quality of work, (6) cooperation between workers in keeping birds moving from one operation to the next, (7) aptitude of workers to the job assigned, and (8) age, condition, and type of bird.

The average rate of drawing poultry at 13 farm plants, 20 birds per hour, is 6 birds or 30 percent per man-hour less than the New York dressing rate at 19 farm plants. At 11 small commercial plants the average drawing rate per man hour - 43 birds - is 3 birds or 8 percent more than the New York dressing rate at 15 small commercial plants.

Many of the plants studied do not meet accepted minimum sanitary requirements as to facilities or operations. Stricter minimum sanitary requirements for handling food products are being formulated and enforced by some cities and by the United States Government for interstate shipment. Proper sanitary provisions should be one of the first considerations in the construction of a dressing plant and in its operation.

Only 5 of the plants used overhead power-driven conveyors to move the poultry during dressing and 2 of these were turkey dressing plants. Except for turkeys, a minimum volume of 300 to 400 New York dressed birds an hour appears necessary to justify the use of an overhead conveyor line.

Funnel mounted on a wall or on a stand are most commonly used for the killing and bleeding operations.

All plants use hand-operated hanging, scalding, and moving devices except 5 which use power-driven conveyor chains and 4 which have commercial, automatic, batch scalders of 10 to 16 bird capacity.

Electrically-driven non-automatic drum pickers are used in most of the plants. Many of the pickers used are too narrow for best results. A minimum working width of 20 inches per picker-worker is recommended especially if fowl and turkeys are dressed.

With few exceptions, the dressed birds are cooled in cold, running water or in tanks or vats containing cold water or ice and water. Oblong, galvanized, livestock-watering tanks and barrels are commonly used but a variety of other cooling receptacles are used also.

Sewage disposal often creates a problem for poultry dressers. The farm plants most commonly use septic tanks and the city plants city sewers.

A wide variety of types of packing containers are used. Wooden boxes are the most common type with bushel baskets and barrels next in importance. The dressed birds are often individually wrapped in butcher or other paper.

Tables of various types and sizes are used for drawing or preparing ready-to-cook poultry. The regular commercial stainless steel table for preparing ready-to-cook poultry is satisfactory for either drawing or ready-to-cook operations.

The sales outlets of both the farm and small commercial plants varies widely. The small commercial plants sell more of their output to wholesalers than the farm plants which sell a larger part of their output directly to consumers, grocers, and butchers.

Important points to be considered in constructing and operating a small poultry dressing plant are (1) suitable plant location for procuring poultry and labor, a good water supply, and sewage disposal; (2) moderate plant investment because plants are not fully used; (3) well-planned plant layout and construction; (4) proper equipment; (5) market outlets available; (6) experienced management; (7) acceptable sanitation and quality standards of products and operations; (8) coordinated effort among employees; and (9) over-all efficient plant operation.

More small local poultry dressing plants are recommended as a method of making dressed poultry more readily available in the producing areas and in and around towns and cities. If poultry is properly dressed and marketed locally, consumption can be increased enormously. This will not only help to increase the per capita consumption but will help to prevent the price-depressing gluts on the large key poultry markets. The dressing and marketing of poultry offers opportunities for producers, small businesses, and cooperative frozen food locker plants.

PLANS AND OPERATIONS
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POULTRY DRESSING PLANTS

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INTRODUCTION

Cash farm receipts from the sale of poultry, including turkeys, in the United States in 1949 amounted to about \$1 1/5 billion. Much of this poultry was dressed locally and an important portion was consumed in the area where produced. Less and less live poultry is being sent to the terminal markets than in prior years. Poultry is dressed chiefly on farms and in both large and small commercial and cooperative dressing plants in the producing areas.

Because of the importance of poultry marketing and the lack of satisfactory published information on poultry dressing, two studies have been made by the Farm Credit Administration of poultry dressing plants under the Research and Marketing Act of 1946. The first study dealt with the layout and operations of 13 large cooperative dressing plants.¹ This, the second study, covers the plans and operations of 48 selected farm and small commercial plants in 10 States.

In this report, the term "small plants" is used in referring to plants that usually dress less than 400 birds an hour, which have no overhead conveyor lines, and do not use large-scale automatic dressing equipment.

Farmers, commercial poultry producers, poultry and egg dealers, cooperatives, and others have for many years dressed poultry on a relatively small scale for local consumption. Some farmers who raise poultry principally for egg production have installed dressing equipment because they found it difficult to sell the culled birds. Some broiler producers started dressing their poultry during the war when meat was scarce and nearby market outlets were readily available at ceiling prices. Others combined dressing and marketing with production for increased returns.

Note: Credit is due W. M. Hurst, Senior Agricultural Engineer, EPISAE, for assistance in the preparation of the report.

¹Hurst, W. M. Layout and Operations of Cooperative Poultry Dressing Plants. U. S. Farm Credit Admin., Misc. Rpt. 101. 56 pp. Washington, 1946.

Some cooperative frozen food locker plants dress small volumes of poultry for their patrons as well as to sell commercially. Locker plant operators, both cooperative and non-cooperative, are interested in flexible poultry dressing operations. If the layout and equipment is suitable, the plant can expand its processing with very little additional expense for some extra help and with greater use of some equipment. There are hundreds of such small plants, with the heaviest concentration in the Northeastern States.

PLANTS STUDIED

In response to requests for information on the plans and operations of small dressing plants, the Farm Credit Administration, in cooperation with the Bureau of Plant Industry, Soils, and Agricultural Engineering, starting in 1948, studied two types of small plants - farm plants and small commercial plants - in a number of Northeastern and East Central States.

Most of the plants surveyed were selected from those suggested by officials of the State colleges of agriculture or other State agencies. No attempt was made to obtain a random or representative sample of small plants. Instead, the more prominent, efficient, and progressive plants were selected for the study. These plants were selected because their layouts and operations were recommended as being successful, and offered the best source of information.

Of the 53 small dressing plants visited, usable information was obtained from 48. Of these 25 were farm plants and 23 small commercial plants. In this report, farm plants are plants supplied with all or most of the poultry dressed from the farm of the operator. Small commercial plants are plants usually operated by non-farmers, located in or near an urban area, who purchase all or most of their poultry and, to distinguish them from large commercial plants, plants which dress a maximum of 400 birds an hour, and do not use overhead conveyor lines. Several of the small plants included, however, used overhead conveyor lines principally for turkeys but had capacities of less than 400 birds an hour.

The 48 plants studied were located in 10 States: Connecticut 3, Indiana 6, Maryland 2, Massachusetts 7, New Hampshire 8, New Jersey 6, New York 3, Ohio 9, Virginia 1, and West Virginia 3 (figure 1).

Most of the plants dressed chickens only. Four of the farm plants were essentially turkey dressing plants and two of the small commercial plants were operated in connection with cold storage locker plants.

The study was made primarily from an engineering standpoint relative to plant layout, type of equipment, and use of labor. However, considerable related information of a descriptive, economic, and statistical nature was obtained with regard to such phases as plant investment, plant capacity, types of poultry dressed, sales outlets, number of workers, output per hour and per worker, use of equipment, and availability of

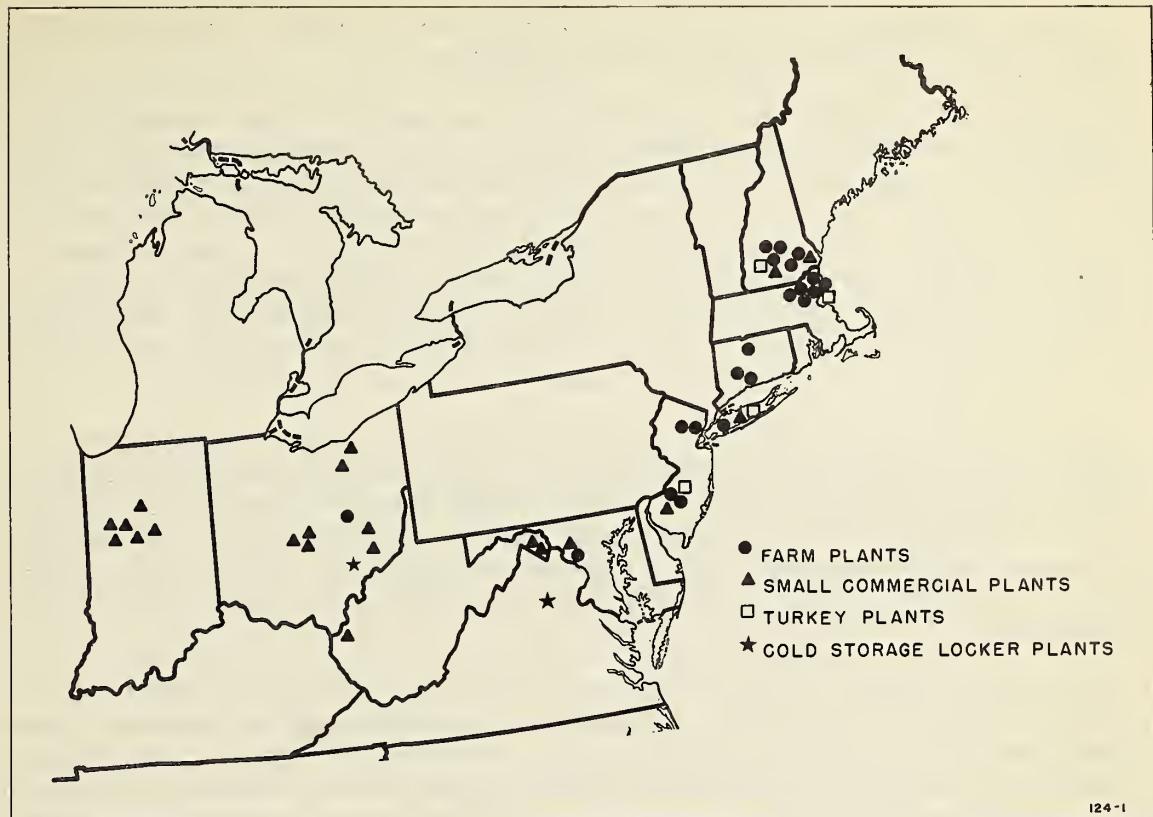


Figure 1. - Location of poultry dressing plants studied.

public services. No attempt was made to make an operating cost analysis of the operations. This would have presented a number of problems due chiefly to the general lack of adequate cost records of any kind and the family nature of the majority of operations. The information was obtained by interviews with operators or managers, by observation, and by time studies. The methods employed and the results obtained were studied to determine what constitutes an effective combination of facilities and labor for dressing poultry in plants of different types and sizes.

OBJECTIVES OF THE STUDY

The chief objectives of this study of small poultry dressing plants were (1) to afford descriptions of the operations, layouts, and facilities of small plants, (2) to determine the feasibility of small poultry dressing operations in relation to egg-handling, cold storage locker plants, and other country point enterprises, (3) to develop plans for efficient small plant operation, and (4) to determine methods of increasing the efficiency of small poultry processing plants.

In most processing and manufacturing plants the trends generally have been toward large-scale, production-line operations for greater output per worker, closer technical control, standardization of quality, and

the use of specially skilled personnel. As a result, most previous research has related to large plant operation.

Some previous Farm Credit Administration surveys and studies have indicated, however, there are limitations and disadvantages in the operation of large poultry dressing plants unless production, marketing, and other conditions are favorable. Among these are (1) relatively heavy investment in plant and equipment, (2) need for large volumes of poultry nearby, (3) difficulties of retaining satisfactory outlets in terminal wholesale markets, (4) high labor wage rates, (5) high labor turn-over, (6) low labor output, (7) need for experienced and skilled plant management, and (8) high seasonal variation in plant use.

Except in areas of heavy and concentrated broiler, turkey, or duck production the successful operation of large-scale dressing plants is likely to be difficult. On the other hand, under favorable conditions and with changes in dressing techniques and other phases of poultry processing and marketing, there may be advantages in large plant operation over small plant operation even in areas of relatively light production.

In many instances, there apparently are advantages in small plants especially where the supply of poultry is scattered and seasonal, and operations are confined to dressing and drawing. Small plants lend themselves to family operation. Owner-operators of small plants can make quick decisions when changes occur in the price and demand for their product. Recent developments in poultry dressing machinery for small plants, such as mechanical pickers and scalders with automatic temperature control, have greatly increased the labor efficiency in processing poultry in farm and small commercial plants. These small plants also may be operated in conjunction with some farming or other business, thereby spreading the work for employees.

Small dressing plants appear to have some definite advantages over large plants in most areas. Among these advantages may be (1) greater labor output, (2) smaller plant investment, (3) lower labor and most other costs, (4) lower personnel turn-over, (5) less labor difficulties, (6) less managerial ability needed, (7) little transportation of poultry required, (8) more stable markets and outlets, (9) more uniform week-by-week operations, (10) quick and easy adjustment of operations, and (11) less difficult disposal of offal. Obviously, an individual small plant may not have all of these advantages. Some may have other advantages. On the other hand, small plants may have some disadvantages such as inadequate water supply, refrigeration, and sewage disposal.

Despite their advantages, many of the small poultry dressing plants studied are inefficient, lack adequate sanitation, and could be greatly improved. This has resulted because most of these small plants, and many of the large plants as well, developed without adequate planning or experienced guidance or supervision of facilities or operations.²

²For a report on dressing chickens on farms see: Searls, Elmer M. Dressing of Chickens on New York Farms. Cornell Univ. Expt. Sta., A.E. 653, 32 pp., Ithaca, N.Y., 1948. Mimeographed.

Most of the small plants covered in this study were not built for poultry dressing. In many instances, whatever buildings were available were adapted to the dressing operation. As a result, many of the plants are inefficient, especially in the use of labor. Labor cost constitutes the bulk of the dressing cost in small plants and, with the increasing cost of labor, its more efficient use is necessary if poultry processing costs are to be kept as low as possible.

An important part of this report deals with plans for plant and equipment layout to assist present and future operators to avoid many of the mistakes made in the past and to assist them in operating more efficiently.

It is probable that by developing small dressing plants in poultry producing areas, production can be substantially increased without unduly affecting the terminal market supply and prices. By dressing birds locally and carrying on an aggressive merchandising program, local consumption can be increased. Around many cities heavy poultry production has developed, more of which can be absorbed locally if the poultry is properly and efficiently dressed and effectively marketed. With higher transportation rates it will become more and more advisable for both producers and plant operators to market a larger part of their output locally. Not only will this result in a larger per capita consumption of poultry in the area produced, but it will enable increased production to be more readily absorbed and will cause the terminal market prices to be less disturbed by changes in production and marketing.

This report is divided into three major parts: (1) An over-all general description of the plants studied, (2) description of particular plants, and (3) suggested plant and equipment layouts.

GENERAL DESCRIPTION OF PLANTS

In this over-all description of the 48 plants, the farm plants and the small commercial plants are discussed separately in order to make comparisons.

FACILITIES USED

Location

The farm plants studied are located on farms where most or all of the birds processed are raised. The dressed poultry is usually sold locally. None of the farm plants studied were close to towns or cities of over 50,000 population. The average population of their post office town is 8,400. Poultry dressing at the farm plants studied is usually subsidiary to other farm operations, such as the production of eggs, baby chicks, poultry breeding stock, fluid milk, fruit, vegetables, and grain.

The small commercial plants are usually located within town limits, in some cases on main highways adjacent to residential districts. Most or

all of the birds dressed are purchased from farmers, poultry dealers, or at auctions. A few operators raise enough of the poultry they dress to require the services of a crew not associated with other farm work. To obtain enough birds for their sales outlets, some plants purchase live birds from several hundred miles away. They either haul the birds to the plant themselves or hire truckers. Some small commercial plants have no other related business, but with the majority poultry dressing is a part of an established poultry and egg business.

Investment

A separate farm building is most frequently used for dressing plants on farms, but in some instances a part of the poultry house, garage, granary, farm house, barn, tool shed, house basement, incubator or brooder house, or other farm building is used. This makes it difficult to determine accurately the cost or current value of the part of the building used for poultry dressing. Only 5 of the 25 farm buildings used were built especially for poultry dressing.

Separate buildings for dressing were used in 7 of the 23 small commercial plants. Other buildings are usually those in which the live poultry is held and eggs handled and sold. A number of the buildings used for poultry dressing were built especially for that purpose, but these are in the minority.

Buildings

The investment in farm dressing facilities varies widely. The average investment in the building or part of building used for dressing chickens on 20 farms was \$2,565 and ranged as high as \$10,000 (table 1). In only 5 of the 20 farm plants was the investment in the building used for dressing more than \$3,000 and the most common range was between \$1,000 and \$3,000. The investment in the commercial plants was usually larger than in the farm plants. The average investment in the building used was \$6,357 and ranged as high as \$35,000 (table 1).

Machinery and Equipment

In 20 farm plants the investment in machinery and equipment, excluding refrigeration equipment, ranged from \$15 to \$3,000, with an average of \$1,599 (table 1). In some cases pieces of equipment were home-made or adapted for use in the dressing operation. Only one-third of the farm plants had dressing machinery and equipment valued at more than \$1,000.

The value of machinery and equipment in the turkey plants ranged from \$750 to \$5,500.

In the small commercial plants the average investment in machinery and equipment was \$2,168 compared with \$1,599 in farm plants. The range was wider also, from a low of \$500 to a high of \$8,000.

The two locker plants had dressing equipment valued at \$670 and \$1,000.

Table 1. - *Investment in buildings, processing machinery and equipment, and trucks and refrigeration in farm and small commercial poultry dressing plants*¹

AMOUNT OF INVESTMENT	BUILDINGS		PROCESSING MACHINERY AND EQUIPMENT		TRUCKS, REFRIGERATION, AND OTHER		TOTAL INVESTMENT	
	FARM PLANTS	SMALL COMMERCIAL PLANTS	FARM PLANTS	SMALL COMMERCIAL PLANTS	FARM PLANTS	SMALL COMMERCIAL PLANTS	FARM PLANTS	SMALL COMMERCIAL PLANTS
<i>Number of plants</i>								
None-----	4	8	-	-	9	13	-	-
Less than \$1,000-----	2	-	13	4	2	-	6	2
\$1,000 - \$2,999-----	9	2	6	12	8	4	2	3
\$3,000 - \$4,999-----	1	3	1	4	1	1	4	2
\$5,000 - \$7,999-----	2	3	-	-	-	2	6	5
\$8,000 - \$11,999-----	2	2	-	1	-	-	1	8
\$12,000 - \$19,999-----	-	-	-	-	-	-	1	-
\$20,000 - \$35,000-----	-	3	-	-	-	1	-	1
Over \$35,000-----	-	-	-	-	-	-	-	2
Total number-----	20	21	20	21	20	21	20	21
Average investment-----	\$2,565	\$6,357	\$1,599	\$2,168	\$965	\$1,890	\$5,129	\$10,415
Range of investment-----	\$0 - 10,000	\$0 - 35,000	\$15 - 3,000	\$500 - 8,000	\$0 - 4,000	\$0 - 30,000	\$500 - 18,000	\$500 - 47,500

¹This table does not include the turkey dressing plants or the locker plants.

Trucks, Refrigeration, and Other

In addition to investments in buildings, dressing machinery, and equipment, operators had considerable investments in other items, particularly in trucks and refrigeration. In the farm plants this averaged \$965 and in the small commercial plants, \$1,890. The turkey plants, chiefly because of a large amount of refrigeration equipment, had an investment in these other items which averaged \$5,017 and was as high as \$8,600.

Total Per Plant Investment

The average total investment in the poultry dressing operation was \$5,129 at 20 farm plants with an over-all range from \$500 to \$18,000. For the small commercial plants it averaged more than twice as much, \$10,415, and had a wide range, from \$500 to \$47,500.

PERIOD OF PLANT OPERATION

Farm dressing operations had been carried on for at least 6 years in two-thirds of the farm plants visited (table 2). The average was

Table 2. - Number of years which poultry dressing plants have operated

YEARS	NUMBER OF PLANTS		
	FARM	SMALL COMMERCIAL	TOTAL
1 - 5-----	8	5	13
6 - 10-----	6	2	8
11 - 15-----	3	4	7
16 - 20-----	3	1	4
21 - 30-----	5	6	11
31 - 50-----	0	3	3
51 - 100-----	0	1	1
Over 100-----	0	1	1
Total-----	25	23	48
Total years of operation--	318	523	941
Average years of operation--	12.7	22.7	19.8

Table 3. - Number of birds New York dressed per hour in farm and small commercial poultry dressing plants

BIRDS PER HOUR	NUMBER OF PLANTS		
	FARM	SMALL COMMERCIAL	TOTAL
1 - 25-----	2		2
26 - 50-----	9	4	13
51 - 75-----	6	6	12
76 - 100-----	3	5	8
101 - 125-----	2	1	3
126 - 150-----			
151 - 175-----			
176 - 200-----	1		1
201 - 250-----		4	4
251 - 300-----	1	2	3
301 - 400-----	1	1	2
Over 400-----			
Total plants----	25	23	48
Average birds per hour-----	88	131	105
Range in birds per hour-----	20-400	40-400	20-400

12.7 years. Eleven plants had been in operation from 11 to 30 years. In about three-fourths of the farm plants the operation has always been under the present operator.

The average age of the small commercial dressing operation, 22.7 years, was 10 years more than that of the farm plant (table 2). Not only were there relatively few new small commercial plants but there were a number of older plants. One plant had been in operation for more than 50 years and another for more than 100 years. Despite the fact that the majority of the commercial plants were more than 15 years old, about half of them were operating under the original management. This is indicative of slow turnover and apparent satisfactory operating returns.

It should be borne in mind that the plants surveyed were not representative in age of operation or in other respects of all the small plants in the area. Because of the method of selection, many of them were the older, long-established plants.

PLANT OUTPUT

Per Hour

The output of New York dressed³ poultry of the 48 plants ranged from 20 to 400 birds an hour with an over-all average of 105. The farm plants had an average output of 88 birds an hour compared with 131 for the small commercial plants (table 3). Fifteen of the

³Dressed or New York dressed poultry is poultry which has been slaughtered for human food, with head, feet, and viscera intact and from which the blood and feathers have been removed.

plants had an output of 50 or less birds per hour, and 20 plants had capacities of 51 to 100. That is, nearly three-fourths of the 48 plants had a New York dressed output of 100 or less birds per hour. Only 9 of the 48 plants dressed 200 or more birds per hour. As expected, a larger number of the small commercial plants were in the higher output ranges than the farm plants.

Per Day

The plants New York dressed a varied number of hours a day so the average number of birds dressed during a normal dressing day was determined to facilitate comparisons. Table 4 shows the output during normal dressing days, which ranged from 1 to 10 hours. The over-all output ranged from 60 to 4,800 birds with an average of 712 (table 4). The average output for a day of the farm plants - 435 birds - was less than half that of the small commercial plants, 1,014 birds. Only 2 of the farm plants dressed more than 800 birds a day, but 8 small commercial plants exceeded this number.

Table 4. - *Average and range in New York dressed output a day in farm and small commercial poultry dressing plants*

BIRDS PER DAY	NUMBER OF PLANTS		
	FARM	SMALL COMMERCIAL	TOTAL
Less than 100---	3		3
101 - 200-----	12	4	16
201 - 400-----	5	7	12
401 - 800-----	3	4	7
801 - 1000-----		1	1
1001 - 1500-----		1	1
1501 - 2000-----		2	2
2001 - 2500-----	1	2	3
2501 - 3000-----	1		1
3001 - 3500-----		1	1
3501 - 4000-----			
4001 - 4500-----			
Over 4500-----		1	1
Total-----	25	23	48
Average birds per day-----	435	1,014	712
Range in birds per day-----	60- 2,800	160- 4,800	60- 4,800

NOTE: The number of hours of operation varied from 1 to 10.

PLANT UTILIZATION

Small dressing plants are usually utilized less fully than the large, mechanized plants. The small plants generally operate only several days a week and a limited number of hours per week. However, nearly all of the small plants, except the turkey plants, operated from 46 to 52 weeks of the year.

Days Per Week

The farm plants operated an average of 2.1 days per week and the small commercial plants 4.8 days, or more than twice as many days. Nearly half the farm plants dressed only 1 day a week (table 5). Only one-fifth dressed more than 3 days a week. On the other hand, all of the small commercial dressing plants operated more than 1 day a week and 14 of the 23 operated 5 or 6 days a week.

Table 5. - Days and hours per week farm and small commercial poultry dressing plants operated

DAYS PER WEEK	NUMBER OF PLANTS			HOURS PER WEEK	NUMBER OF PLANTS		
	FARM	SMALL COMMERCIAL	TOTAL		FARM	SMALL COMMERCIAL	TOTAL
1-----	11		11	1 - 5-----	7	1	8
2-----	7	1	8	6 - 10-----	12	5	17
3-----	2	4	6	11 - 15---	1	2	3
4-----		4	4	16 - 20---	2	1	3
5-----	3	7	10	21 - 25---		2	2
6-----	2	7	9	26 - 30---		1	1
				31 - 35---		3	3
				36 - 40---		2	2
				41 - 45---			
				46 - 50---		4	4
				51 - 60---		1	1
Total plants-----	25	23	48	Total plants-----	22	22	44
Average number days per week-----	2.1	4.8	3.5	Average number hours per week-----	7.5	26.9	17.2

Hours Per Week

The farm plants most commonly operated from 6 to 10 hours a week, usually only 1 full day's operation, averaging 7.5 hours (table 5). None operated more than 20 hours a week and 7 operated less than 6 hours. The small commercial plants show a wide range in the number of hours operated per week. As many operated more than 25 hours a week as operated less than this number of hours. Only one commercial plant operated 5 hours or less a week, but 5 operated 46 or more hours per week. For the commercial plants the average per week was 26.9 hours, or more than three times that of the farm plants.

TYPES OF POULTRY DRESSED

Nearly all the plants dress several types of poultry. The only plants dressing only 1 type were 4 farm turkey dressing plants and 1 farm plant which dressed fowl only. The percentages of different types ranged widely (table 6).

The heaviest emphasis was placed on fryers, particularly in the small commercial plants. At 15 of the 48 plants, fryers constituted more than 40 percent of the poultry dressed and only 11 plants dressed no fryers.

Table 6. - *Types of poultry dressed by farm and small commercial poultry dressing plants*

PERCENTAGE	TYPE OF POULTRY														
	BROILERS			FRYERS			ROASTERS			FOWL			TURKEYS		
	FARM	SMALL COM- MER- CIAL	TOTAL	FARM	SMALL COM- MER- CIAL	TOTAL	FARM	SMALL COM- MER- CIAL	TOTAL	FARM	SMALL COM- MER- CIAL	TOTAL	FARM	SMALL COM- MER- CIAL	TOTAL
<i>Number of plants</i>															
Under 1-----	9	6	15	9	2	11	9	5	14	6	1	7	¹ 19	² 23	³ 42
1 - 10-----	4	5	9	3	2	5	3	11	14	6	4	10	1		1
11 - 20-----	5	2	7	5	1	6	5	4	9	2	7	9			
21 - 30-----	2	1	3	2	2	4	3	3	6	3	7	10			
31 - 40-----	3	4	7	3	4	7	2		2	3	2	5			
41 - 50-----		3	3	1	5	6	1		1	2		2			
51 - 60-----	1		1		3	3	1								
61 - 70-----		1	1	1	2	3				2		2	1		1
71 - 80-----				1	2	3					1	1			
81 - 90-----											1	1			
91 - 100-----	1	1	2				1		1	1		1	4		4
Total plants	25	23	48	25	23	48	25	23	48	25	23	48	25	23	48

¹Small volumes handled seasonally by 4 plants.²Small volume handled seasonally by 12 plants.³Small volume handled seasonally by 16 plants.

Nearly one-third of the plants dressed no broilers and a similar portion dressed no roasters. In nearly half the plants 80 percent or more of their total poultry dressed was young chickens - broilers, fryers, and roasters. All except 7 of the plants dressed some fowl, and 4 of these were farm plants which dressed turkeys only.

Only at 6 plants - 4 exclusively turkey plants - were any percentages obtained on turkeys dressed. However, 4 farm plants and 12 small commercial dressing plants dressed small volumes of turkeys seasonally.

TYPE OF DRESSING

Information was obtained from each plant on the percentage of output normally processed for sale as New York dressed, drawn,⁴ ready-to-cook,⁵ and frozen. Half of the 48 plants processed no New York dressed poultry (table 7) but 6 plants New York dressed all their output. There was

⁴Drawn or rough-drawn is poultry which has been slaughtered for human food, with blood, feathers, head, feet, crop, and viscera removed but which is not ready to cook without further processing.

⁵Ready-to-cook (formerly called eviscerated) is any dressed poultry from which the pin feathers, vestigial feathers (hair or down), head, shanks, crop, oil gland, trachea, esophagus, entrails, reproductive organs, and lungs have been removed and, with or without giblets, is ready to cook without need of further processing. Ready-to-cook poultry may be fresh or frozen whole birds or any cut-up or disjointed part thereof.

Table 7. - *Type of dressing operation in farm and small commercial poultry dressing plants*

VOLUME DRESSED	TYPE OF DRESSING											
	NEW YORK DRESSED			DRAWING			EVISCERATING			FREEZING ¹		
	FARM	SMALL COM- MER- CIAL	TOTAL	FARM	SMALL COM- MER- CIAL	TOTAL	FARM	SMALL COM- MER- CIAL	TOTAL	FARM	SMALL COM- MER- CIAL	TOTAL
Percent	Number of plants											
Under 1-----	12	12	24	14	4	18	11	18	29	19	17	36
1 - 10-----		4	4	1	2	3	2	1	3	3	2	5
11 - 20-----		1	1	1		1	1		1		3	3
21 - 30-----	1		1	1		1	4	2	6			
31 - 40-----											1	1
41 - 50-----	1	1	2				1	1	2			
51 - 60-----								1	1	1		1
61 - 70-----	1		1	1		1				1		1
71 - 80-----	4		4				1		1			
81 - 90-----	2		2	1	2	3						
91 - 100-----	4	5	9	6	15	21	5		5	1		1
Total plants--	25	23	48	25	23	48	25	23	48	25	23	48

¹As a regular practice some plants freeze surpluses and carry-overs.

little difference between the farm plants and the small commercial plants in the percentages which did some New York dressing, but more of the farm plants sold from 40 to 90 percent of their product in this form.

Nearly two-thirds of the plants did some drawing and more than one-third drew all poultry. Drawing was more prevalent among the small commercial plants than among the farm plants, over half of which did no drawing. Of the 21 plants drawing from 91 to 100 percent of their volume, 71 percent were small commercial plants.

Of the 48 plants, 29 prepared no ready-to-cook poultry. Most of these were, in contrast to the situation in drawing, the small commercial plants. Five farm plants prepared all of their output ready-to-cook but no commercial plant prepared more than 60 percent of their output ready-to-cook.

Only one-fourth of the plants customarily did any freezing. This was because most of the plants sold all poultry as fresh-killed. Three farm plants which prepared all or most of their products ready-to-cook, froze half or more of their production. A small number of the plants froze surpluses and carry-overs on occasion.

Type of Scald

In this report "slack" or "semi-scalding" means scalding at temperatures of 125° to 130° F. for at least 20 seconds. "Medium" or "sub-scalding" means scalding at temperatures of 131° to 140° F. for a period of from 30 to 60 seconds.⁶ "Hard-scalding" means scalding at temperatures above 140° F. The water temperatures at several plants ranged from 136° to 154° F. In some localities it is customary not only to scald at medium and high temperatures but also to "plump" the birds after dressing by momentarily immersing them in water at 160° to 200° F.

Due to local custom, local demand, preferences and other factors, significant differences were observed in the operations and practices in poultry dressing over the area. In the Northeastern States the scalding temperature of water at most of the plants visited was about 130° F. Farther west in the West Virginia, Ohio, and Indiana plants, scalding temperatures ranged from 140° to 154° F., and some followed the practice of plumping. However, even in the areas where plumping was generally practiced the poultry was not plumped if sold to wholesale buyers for storage or for outside markets.

The average scalding temperature at the farm plants was 131° and 138° F. at the small commercial plants (figure 2).

The reasons given for hard scalding were that it made picking easier, faster, and cleaner, and that local customers preferred it. In some areas hard-scalded poultry is preferred by the consumer because it is

⁶Recently many large dressing plants have adopted the medium-scald temperatures in order to lower dressing costs and obtain a cleaner dressed bird particularly for preparation for sale as other than New York dressed. This higher scalding temperature shortens the shelf life of unwrapped poultry. Prior to June 22, 1950, the U. S. Department of Agriculture did not permit the classification of poultry as U. S. Grade A when temperatures of scalding as high as 135° to 138° F. had been used. Poultry now processed by means of these scald temperatures may be graded as U. S. Grade A and so labeled, when (a) all the outer cuticle is removed; (b) the skin (other than the outer cuticle) or muscular tissue shows no evidence of cooking; (c) poultry so processed is over-wrapped or over-packed on an individual-bird basis with acceptable packaging material.

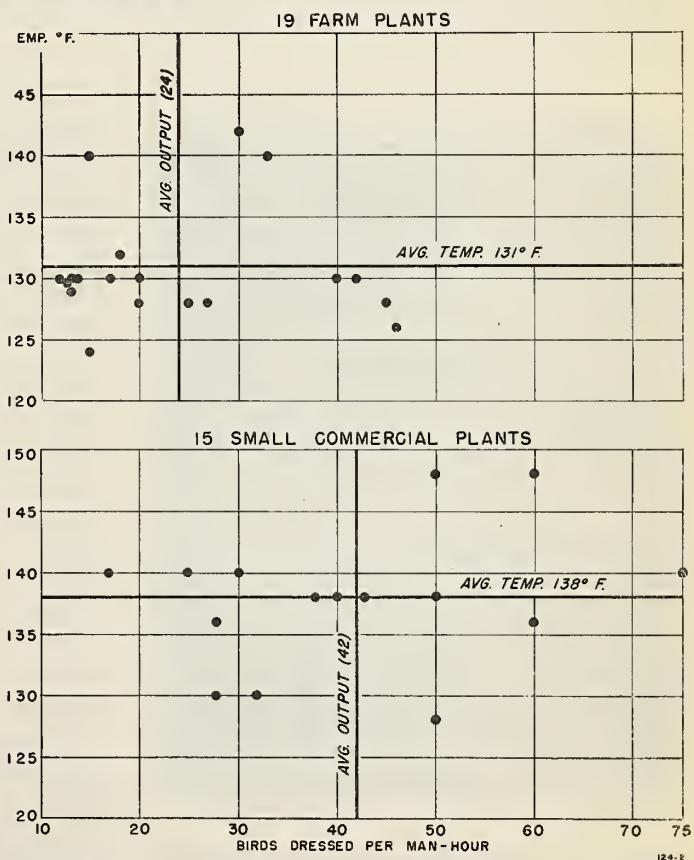


Figure 2. - Relationship of scalding temperature to man-hour dressing output.

assumed to be fresh-killed and locally grown. Semi-scalded New York dressed poultry is assumed to have been shipped in or to be cold-storage poultry which might have off-flavors due to improper handling, the period elapsed since dressed, and absorption of off-flavor from entrails.

PROCESSING OPERATIONS

Dressing Practices

In the Northeast the birds are customarily taken from the crates in pairs, bled in cone-shaped funnels, scalded, and picked on a power-driven drum picker, often by the same worker, or laid on a table or tray for another worker to pick mechanically. Other workers remove the pin feathers from these birds which are then dropped in a tank of iced or running water to remove the body heat. The New York dressed birds are usually left in a tank of cold water for 3 or 4 hours before drawing.

In some Pennsylvania and Maryland plants, 6 to 8 birds are hung together by one leg on a single looped rope, bled, scalded in batches, and then placed on a convenient table within reach of the pickers. Several plants used a 5-bird shackle but, by hanging by only one leg, they were able to shackle 10 birds at a time (figure 3).

Individual differences in dressing practices are discussed further in the chapter on individual plants

Number of Workers

The average number of workers used, including the operators, was 3.8 persons for the farm plants, excluding turkey plants, and 5.9 persons for the small commercial plants (table 8). Three and 4 workers were the most common numbers used in the farm plants and no farm plant used more than 7 workers, except the turkey dressing plants, 1 of which used 28 workers, during its short turkey marketing season. In some farm plants all of the processing is done by members of the family. In others the regular farm help is used at times when it can be spared from other farm work. A larger number of small commercial plants used 3 workers than any other number. Although 8 small commercial plants used more workers than any of the farm plants which dressed chickens primarily, more than half of the small commercial plants used less than 6 workers.

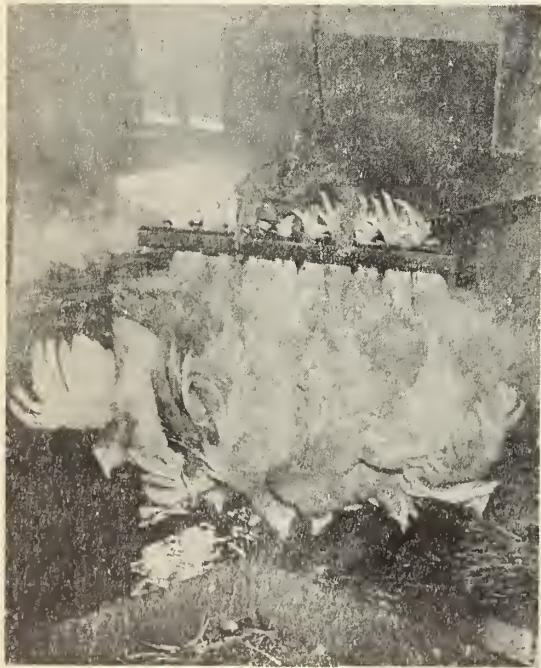


Figure 3. - This detachable multi-bird shackle is used in killing, bleeding, and scalding as many as 10 birds at a time.

Table 8. - *Number of workers in farm and small commercial poultry dressing plants*

NUMBER OF WORKERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	28	TOTAL PLANTS	WORKERS	
	TOTAL	AVERAGE																
Farm plants-----	1	2	6	6	2	2	1	1 ¹	1 ¹	1 ¹	0	0	0	0	1 ¹	25	2 ⁷ 6	2 ³ .8
Commercial plants-----	0	4	5	2	1	0	3	1	3	1	2	0	1	0	0	23	137	5.9
Total-----	1	6	11	8	3	2	4	2	4	2	2	0	1	1	1	48	2 ² 13	2 ⁵ .0

¹Chiefly or all turkey dressing.

²Not including plants dressing turkeys primarily.

These numbers of workers were the numbers normally used during the regular dressing operations. In most instances, the number of workers changed little either seasonally or whether New York dressing, drawing, or ready-to-cook dressing was done. The drawing and ready-to-cook operations were often done after all the birds had been New York dressed. The numbers of hours of operation varied with the volume and type of dressing rather than with the number of workers.

Wages Paid

There was a wide range in wages paid not only between plants, but within many plants (table 9). The type of work done, experience of the worker,

Table 9. - *Wages paid, July 1948, in farm and small commercial poultry dressing plants*

WAGE RATE ¹	PER HOUR	PER WEEK ¹	NUMBER OF FARM PLANTS	NUMBER OF SMALL COMMERCIAL PLANTS	
				1	2
\$0.50-----			1		-
.55-----			1		-
.63-----			-		1
.75-----			-		2
.85-----			2		3
.90-----			1		-
1.00-----			1		1
1.35-----			-		1
.35-1.00-----			1		-
.50-.85-----			1		-
.50-1.00-----			1		-
.56-.70-----			1		-
.63-.75-----			1		-
.65-.85-----			1		-
.65-1.00-----			-		1
.70-.75-----			-		1
.70-1.00-----			2		3
.70-1.25-----			-		1
.75-.85-----			1		-
.75-1.00-----			1		-
.80-1.00-----			-		1
.80-1.50-----			-		1
.90-1.00-----			-		1
.90-1.50-----			1		-
1.00-1.35-----			-		1
1.00-1.87-----			1		-
	\$35-----		1		-
	35-75-----		1		-
	45-----		1		-
	50-----		1		-
Total plants-----			22		18

¹When workers were paid on a weekly basis they did other work on the farm besides dressing poultry.

period of employment, geographic location, and size of plant were among the factors causing wage differences. All of the small commercial plants paid employees on an hourly basis, but 4 of the farm plants paid on a weekly basis inasmuch as the workers did other farm work. The over-all hourly wage rate, not including overtime as such, ranged from 50 cents to \$1.87. In 22 plants, with differences in hourly rates, the average spread between the low and the high hourly rate was 34 cents.

Output Per Worker

New York Dressed

The numbers of chickens New York dressed per hour per worker at 19 farm plants and 15 small commercial plants and related data for which satisfactory information was obtained in this study are shown in table 10.

Table 10. - *Comparison of dressing plant output, number of workers, and per man-hour output of four groups of poultry processing plants*

ITEM	TYPE OF PLANT			
	FARM PLANTS		COMMERCIAL PLANTS	
	CORNELL GROUP ¹	FCA GROUP ²	FCA SMALL PLANT, GROUP ²	FCA LARGE PLANT, GROUP ³
Number of plants-----	14	19	15	11
Normal plant output, birds per hour:				
Average-----	40	89	168	1,210
Range-----	8-94	25-400	40-400	350-1,950
Number of workers:				
Average-----	3.1	3.4	4.2	49.4
Range-----	1-6	2-7	1-9	16-94
Number of birds New York dressed per worker per hour:				
Average ⁴ -----	13	26	40	25
Range-----	4-31	12-46	17-75	16-29

¹Calculated from data in Cornell University Agricultural Experiment Station, A.E. 653, Dressing of Chickens on New York Farms, by Elmer N. Searls, 32 pp. 1948, Mimeographed.

²Data from this study.

³Calculated from data in Farm Credit Admin., Misc. Rpt. 101, Layout and Operations of Cooperative Poultry Dressing Plants, by W.M. Hurst, 56 pp. 1946.

⁴Unweighted average.

The average for these farm plants was 26 birds per-hour per-worker with a range from 12 to 46 birds. The 15 small commercial plants dressed an average of 40 birds per worker per hour. They ranged from 17 to 75 birds per worker per hour. The average output per worker at the small commercial plants was 54 percent higher than at the farm plants and 60 percent above the output of 11 large plants previously studied. The average per man-hour output at the 19 farm plants was slightly higher than at the 11 large plants (table 10).

The greater average output per man-hour in the smaller commercial plants than in the 11 large plants may be due to a number of factors such as (1) less idle and unproductive time, (2) workers with more experience and skill, (3) more diligent workers, and (4) the particular plants selected. Essentially the same method of measuring per man-hour output was used in the Farm Credit Administration studies of both large and small plants.

The 19 farm plants covered in this study are more than twice as large in normal per-hour plant output as the 14 farm plants covered in the Cornell study (table 10) and the per-worker per-hour output is twice as many.

At the 2 locker plants and the 4 turkey plants, not included in table 10, the average man-hour dressing rates were 26 chickens and 14 turkeys, respectively.

The performance of workers in the 2 types of plants covered in this study is not entirely comparable as most of the commercial plants visited were in areas where hard scalding is practiced and most of the farm plants visited were in slack scalding areas.

Higher average scalding temperatures were used at the small commercial plants than at the farm plants (table 11). The

Table 11. - *Scalding temperature and average man-hour output in farm and small commercial plants*

TEMP. °F.	PER MAN-HOUR OUTPUT			
	FARM PLANTS		SMALL COMMERCIAL PLANTS	
	INDIVIDUAL PLANTS	AVERAGE	INDIVIDUAL PLANTS	AVERAGE
<i>Number of birds.</i>				
124	15	15		
125				
126	46	46		
127				
128	45, 25, 27, 20	29	50	50
129	13	13		
130	42, 13, 13, 12, 17, 20 13, 40		28, 32	30
131		21		
132	18	18		
133				
134				
135				
136			28, 60	44
137				
138			38, 40, 43, 50	43
139				
140	33, 15	24	75, 17, 25, 30	37
141				
142	30	30		
143				
144				
145				
146				
147				
148			60, 50	55
149				
150				
	Average ¹	² 24	Average ¹	³ 42

¹Weighted average.

²Weighted average temperature 131° F.

³Weighted average temperature 138° F.

higher scalding temperature at the small commercial plants may be a factor in their greater output as a group. However, while a few of the plants, especially a few of the small commercial plants, which used higher scalding temperatures (above 135° F.) had large per man-hour outputs, no direct relationship between scalding temperatures and man-hour output was found among plants in the 2 groups. Table 11 and figure 2 show the per man-hour output at the different scalding temperatures. At 128° F. the range among 4 farm plants was from 20 to 45 birds per man-hour; at 130° F. the range among 8 farm plants was from 12 to 42 birds - with 3 plants dressing 13 birds per man-hour. Among the small commercial plants, a similar wide range of output per man-hour exists. At 136° F., one small commercial plant has a man-hour output of 28 birds; at another it is 60 birds. At 140° F. the range among 4 small commercial plants is from 17 to 75 birds per man-hour.

A very wide variation in the performance of crews regardless of the type of scald was found among the 48 plants. Observation and time checks indicate that these differences may be due to a number of factors. No attempt was made to measure the effect of each factor or group of factors. Among the probable factors are: (1) Scalding temperature, (2) plant layout, (3) kind, amount, and condition of equipment, (4) convenience of methods of moving birds from one operation to another, (5) arrangement of equipment, (6) diligence of workers, (7) aptitude of workers for the job assigned, (8) the skill of workers in operating pickers as to thoroughness of plucking and amount of pin feathers removed, (9) the skill and speed of pinning and the completeness of satisfactory pin feather removal, (10) quality of work done, (11) cooperation between the workers

in keeping a steady flow of birds moving from one operation to another and, (12) age, condition, and type of bird.

Table 12. - Performance of workers in dressing chickens at plant 4.

OPERATION	EM- PLOYEES	TIME FOR 12 BIRDS	RATE OF BIRDS DRESSED PER HOUR	
			PLANT	PER WORKER
Removing from coops, hanging, sticking, and bleeding-----	Number	Seconds	Number	Number
Scalding-----	1	102	423	423
Picking-----	1	120	360	360
Pinning, removing heads, legs, and submerging birds in cooling vat-----	1	147	294	294
	2	346	¹ 250	125

¹Two employees.

The result of a repeated time check made at a well-equipped and efficiently-operated small commercial plant is shown in table 12 (plant 4). While labor efficiency is much above average at this plant and the workers were probably aware that they were being timed, the table illustrates the time required in this instance for individual operations.

One worker at plant 4 shackled from coops and killed at the rate of 423 birds per hour. At the same time

the scalding was done at the rate of 360 birds per hour by one man handling 12 birds as a unit. The picker operated at the rate of 294 and the two pinners together at the rate of 250 birds per hour during the timing period. On this basis and under the conditions found at this plant, at least two pinners are needed for each picker depending upon the thoroughness of the picking job. Some managers consider a picking rate of 120 slack-scald birds per hour as satisfactory performance for one man. Under normal operating conditions probably some of the crew at plant 4 did not work as fast as when timed. The picker and two pinners probably operated normally at a rate of about 250 birds per hour. At this plant the bleeding and scalding were done at a faster rate than the picking and pinning. As a result the killer and scalders helped the pinners occasionally. With an automatic scalding at plant 4 one man might shackle, kill, and slack-scald sufficient birds to keep one picker and two pinners busy. At another plant one man was timed who performed the killing, hard scalding, and picking jobs, not including pinning, at the rate of 120 birds per hour.

Drawing

At some of the plants it was difficult to determine whether birds were being drawn or prepared ready-to-cook. The degree of table readiness varied from rough drawing to almost complete evisceration. This naturally caused a variation in the rate of drawing.

The data used were from plants where the drawing operation was sufficiently separate, either because it was done by separate workers or after the New York dressing had been done, to afford the man-hour rate of drawing. In this study usable data were obtained at 13 farm plants and 11 small commercial plants (table 13). In some of the other plants surveyed, it was not possible to separate the drawing operation from New York dressing. At some plants the drawing was done simultaneously with New York dressing and at others after the New York dressing had been completed and by the same workers.

The rate of drawing varied widely, from 8 to 90 birds per man-hour among 24 plants.

Table 13. - *Drawing chickens: Plant output, number of workers and per man-hour output, farm and small commercial poultry dressing plants¹*

	FARM PLANTS	SMALL COMMERCIAL PLANTS
Number of plants-----	13	11
Normal plant output (birds per hour):		
Average-----	44	136
Range-----	12-150	40-448
Number of workers:		
Average-----	2.2	3.2
Range-----	1-4	1-6
Number of birds drawn per worker per hour:		
Average ² -----	20	43
Range-----	8-38	17-90

¹Does not include turkey dressing plants and locker plants.

²Unweighted averages.

It is affected by the skill and experience of the worker, by the thoroughness of the operation, by the equipment used, readiness and availability of the birds, the technique used, the size and type of birds, and other factors. The normal plant output per hour and the number of workers were larger at the small commercial plants than at the farm plants (table 13). The average number of birds drawn per man-hour at the farm plants was 20 with a range from 8 to 38. At the small commercial plants it was 43 with a range from 17 to 90. The average man-hour rate of New York dressing (table 10) was 6 birds greater, or 30 percent, than that of drawing at the farm plants, but at the small commercial plants the rate of drawing averaged 3 birds more, or 8 percent, than the rate of New York dressing. The high average rates are due in part to very high rates of drawing at several of the plants. The earlier study of large cooperative poultry dressing plants showed man-hour drawing outputs varying from 10.4 to 22.5 birds depending largely upon the method of drawing.⁷

Ready-To-Cook

The data obtained on ready-to-cook dressing of poultry were not adequate to satisfactorily measure the performance rate.

METHODS OF COOLING

In both the farm and small commercial plants the dressed birds are usually cooled in cold running water or in tanks or vats containing cold water or ice and water. A wide variety of cooling receptacles are used, the most common of which are barrels. However, in addition to used and new wooden and metal barrels, the following are used: Hogsheads, live-stock watering tanks, milk coolers, soft drink tanks, wood or metal cooling vats and tanks, washing and laundry sinks, ash cans, electric can coolers, and home-made and other vats and tanks. A small number of the plants have mechanized refrigeration and some of these dry-cool the poultry. However, refrigeration equipment is used chiefly for holding surplus of hold-over drawn and ready-to-cook poultry. A few plants are equipped for freezing part of the output.

The northeastern plants usually leave New York dressed birds in the cooling water from 3 to 4 hours. The plants farther west use water tanks chiefly for rinsing and draw the birds while they are still warm. Vent temperature of chilled birds, tested prior to drawing, ranged from 53° to 72° F. and of those not chilled from 80° to 102° F.

Thirteen of the 25 farm plants obtain their water from their own wells and 12 from the city supply. Only 7 of the 23 small commercial plants have their own wells. At the time of the survey, July and August, the water temperature ranged from 45° to 74° F. In about two-thirds of the plants the water temperature ranged from 65° to 68° F.

⁷Hurst, W. M. Layout and Operations of Cooperative Poultry Dressing Plants. U. S. Farm Credit Admin. Misc. Rpt. 101, pp. 28-29. Washington, 1946.

SEWAGE DISPOSAL

In disposing of sewage nearly all the farm plants have septic tanks although a few drain into creeks. The small commercial plants, on the other hand, generally use the city sewers, but a few have septic tanks and one drains the sewage into a river.

TYPE OF PACK

The processed poultry is packed in a variety of containers. Wooden boxes are the most common with bushel baskets and barrels next in importance. Used also are orange crates, cardboard boxes, bags, and metal boxes. The small commercial plants usually use either wooden boxes or barrels for shipping or delivery.

At about one-third of the plants the birds are not individually wrapped. Where wrapped, parchment paper, waxed paper, refrigerator paper, cellophane bags, and individual cartons are used.

SALES OUTLETS

The sales outlets of both the farm and small commercial plants varied widely. This is particularly true of the farm plants. The small commercial plants usually sell the bulk of their output to such retailers as grocers and butchers (table 14). Wholesale outlets are the next most important type of outlets for the small non-farm plants. While grocers are the most important single type of outlet for the farm plants, a considerable percentage of them carry on their own distribution through sales at the dressing plant, through their own stores and routes, and at stalls in the city markets. The smaller volume of farm plants permits them to sell to retailers and consumers and avoids the need to sell to wholesalers.

TYPES OF EQUIPMENT USED

There was a wide diversity in the type and amount of machinery and equipment used in the plants visited. A brief description is given here of the machinery and equipment used in some of the plants.

Overhead Track Conveyors

Only 5 of the plants visited used overhead power-driven conveyors to move the poultry during the dressing operation. Two of these were turkey plants. Their

Table 14. - *Chief sales outlets of farm and small commercial poultry dressing plants*

TYPE OF OUTLET	NUMBER OF FARM PLANTS	NUMBER OF SMALL COMMERCIAL PLANTS
Retail stores-----	8	10
Wholesalers-----	1	5
Wholesalers and retailers--	2	-
Hotels and restaurants---	1	3
Own stores-----	1	1
Own routes-----	2	-
Retailed at plant-----	2	
City market-----	2	
Jobbers-----	1	
Total plants-----	20	19

use in 4 plants is described in the description of individual plants (pages 31 to 43).

Because of the small capacities of the plants studied, neither an overhead track nor a power conveyor is needed except for dressing turkeys. A pipe or metal rail suspended from the ceiling on which to hang shackles for turkeys is satisfactory.

Killing and Bleeding Equipment

The equipment most commonly used at the plants visited for bleeding poultry are metal funnels attached to the wall, mounted either in cabinets or on a stand or frame (figure 4). The details of the wall type

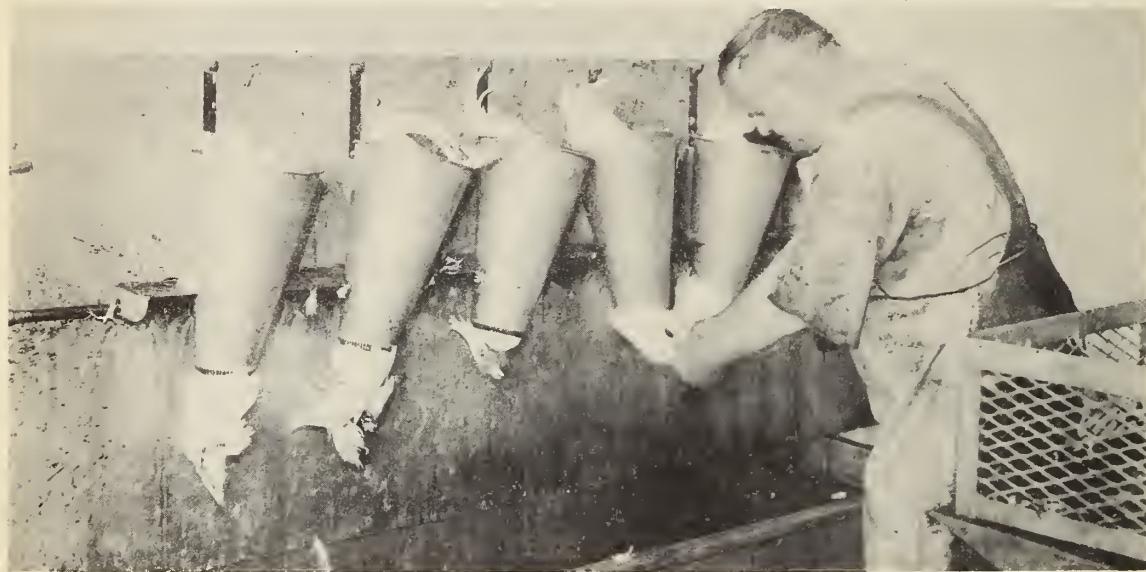


Figure 4. - Most small plants use wall-type funnels for killing and bleeding.

are illustrated in figure 5. The funnels used for chickens are about 8-1/4 inches in diameter at the top, 4 inches at the bottom, and 14-1/2 inches high. For turkeys they are approximately 10-1/2 inches in diameter at the top, 5 inches at the bottom, and 22 inches high. They are usually equipped with a drip pan underneath for blood and have a perforated water pipe spray for washing down the sides of the pan and to dilute the blood for draining into the sewer. One plant used a wagon wheel suspended from the ceiling to which shackles were hung (figure 6).

The next largest number of plants hung 2 to 4 or more birds at a time by one or both legs on ropes suspended from the ceiling for killing and bleeding. In most cases, this method caused the blood and feathers to be scattered over the floor. Some users of this method provide metal enclosures, forming circular or oblong compartments, with ropes hung from rods or pipes with a narrow door through which the birds are hung and later removed (figure 7a). Other methods observed were (1) shackles

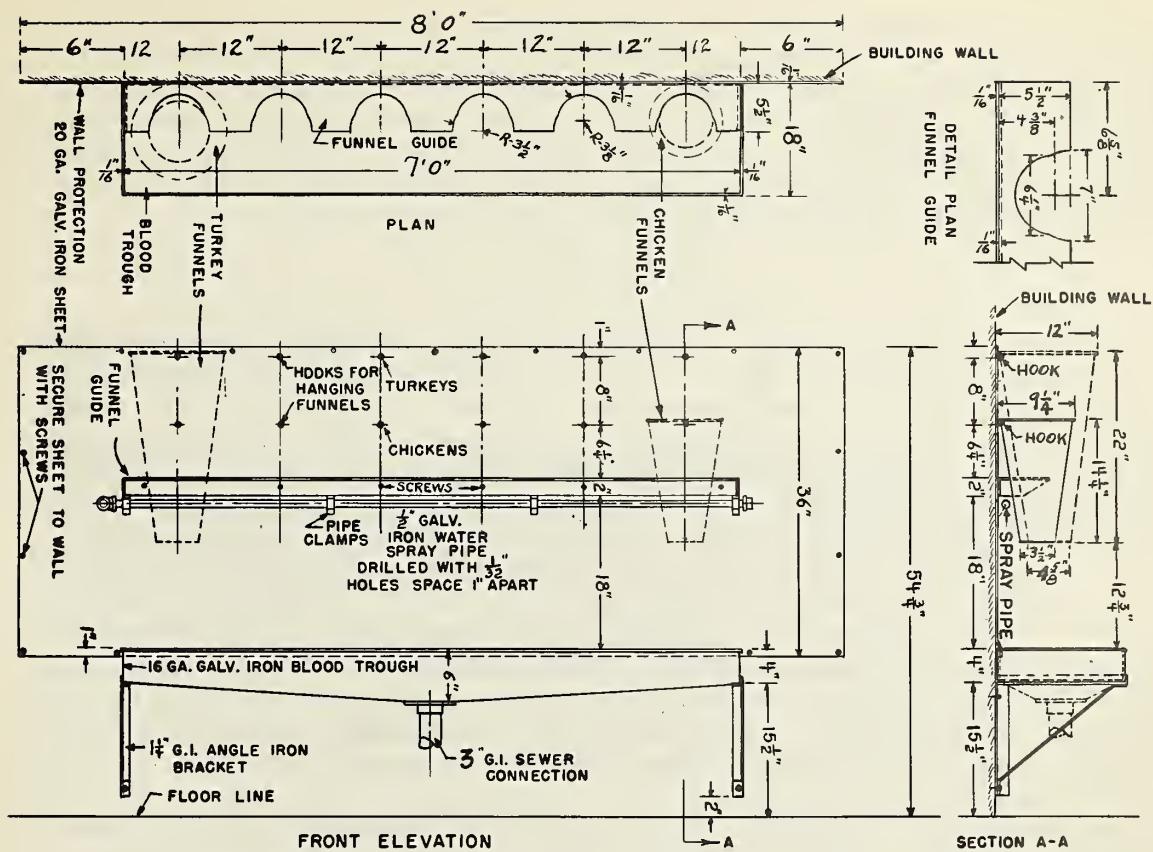


Figure 5. - Detail of wall-type funnel rack.

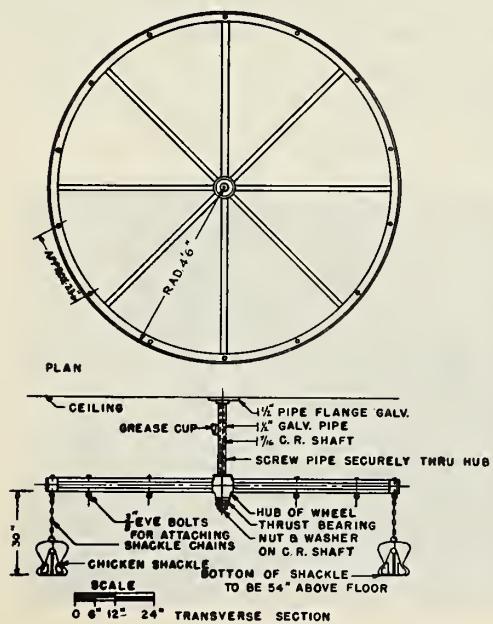


Figure 6. - A suspended wheel is used in some plants for killing, bleeding, picking, and singeing.



Figure 7. - Plant arrangement and equipment used in one commercial plant: (a) killing and bleeding cabinet, (b) scalding tub, (c) picker, (d) plumping tank, (e) rinsing tank, (f) drawing table, (g) cooling tank.

hung from the ceiling (figure 3), (2) chopping off the head and depositing the birds in a barrel, and (3) cutting the throat and depositing the birds in a barrel to bleed. When barrels are used for bleeding, 12 to 18 birds are killed at a time and left in the barrel until the scalders are ready for them. This method has objections because some birds are left too long, some may be improperly bled, and all are covered with blood which pollutes the water in the scalders.

Scalders

The scalders commonly in use in the plants studied consist of insulated metal tanks, approximately 20 x 22 x 36 inches outside dimensions, equipped with electric heating units. These heating units vary from 1,500 to 3,000 watts but a few larger tanks have elements rated as high as 5,000 watts. These electrically-heated tanks are fitted with thermostats and many with water-level controls to replace water absorbed by the feathers or otherwise lost. Electrically-heated scalders with a water-level control connected to a hot water tank save time in starting, as the heating units are not large enough to heat a tank of cold water quickly. Some scalders are equipped with steam coils and gas burners with or without automatic controls. Wash boilers, oil drums, and pails mounted on gas burners or on kerosene stoves are used for scalding in some small farm plants. Such units have no controls and as a result have wide fluctuations in the temperature of the scalding water.

Several plants have automatic batch scalders in which 8 to 16 birds are scalded at a time. The birds are placed in a container by hand but submerged and agitated mechanically for a predetermined period of time. In one such scalding the birds are tumbled in a rotating cylinder (figure 8). In another a basket containing the birds is moved up and down in the water (figure 9). The scalding time with the mechanical scalders ranged from 20 to 60 seconds and the temperature from 128° to 154° F. depending upon the operator's decision of the combination of time and temperature needed for best results under the particular conditions existing.

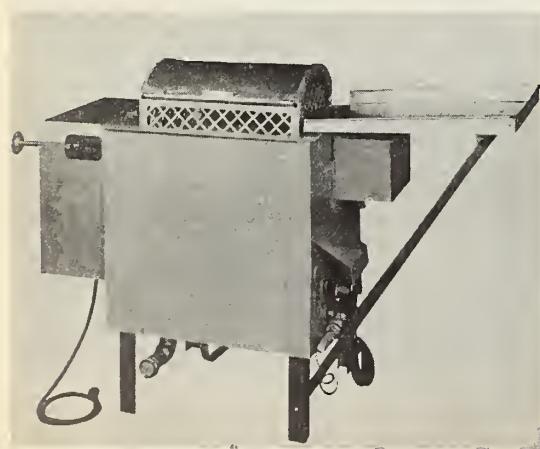


Figure 8. - This automatic scalding machine has a revolving basket.

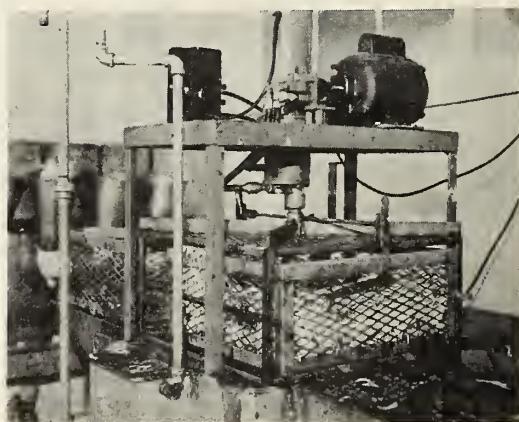


Figure 9. - This automatic scalding machine has a basket which moves up and down in the scalding water.

Pickers

Most plants use mechanical pickers of the rotating drum type with rubber fingers, driven by electric motors. A few use home-made devices and at several plants the picking is done entirely by hand. The commercial pickers appear very satisfactory. They are of metal construction and the picking drum is usually enclosed. The motor also is protected from water and feathers. Most of the feathers pile up under the machine. One operator installed a separate feather collector which simplified feather removal, kept the feathers off the floor, and eliminated much clogging of drains (figure 10).

At another plant, the picker was mounted over a hole in the floor so the feathers would fall into a cart in the basement for removal at the end of the day. One plant provided a hole in the wall, back of the picker, through which the feathers were thrown by the machine and deposited in a container outside the building.

The working width of the picking drums in the machines observed ranged from 12 to 36 inches. Operators generally feel that the 12- and 14-inch wide machines are too small for regular plant operation. If fowl or turkeys are to be dressed, the effective working width should be at least 20 inches. Two employees can work side by side at machines having a working width of 30 inches or more.

A receptacle for birds located between the picker and pinning table or hanging ropes is illustrated in figure 11. This receptacle can easily be made with sheet metal working equipment at the plant or at a local metal shop.

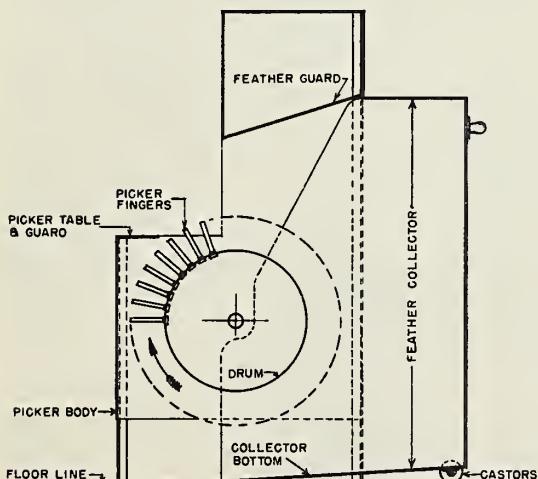


Figure 10. - Suggested feather collector attachment used with a drum-type picker.

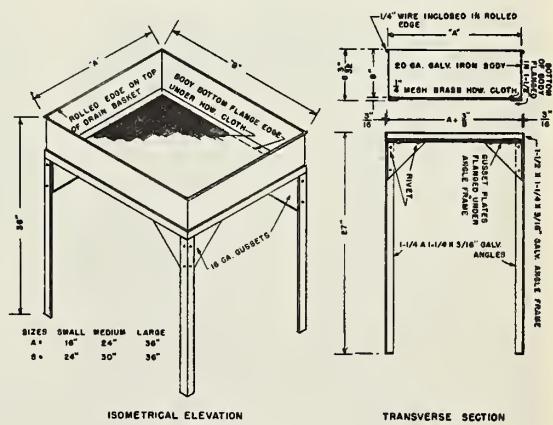


Figure 11. - Suggested table-type receptacle for scalded or picked birds.

Plumping Tanks

A wide variety of tanks are used for plumping. Large metal kettles or altered oil drums mounted on gas or kerosene burners are common. Some commercially-made electrically heated scalders are used. The temperature of the water for plumping ranges from 160° to 200° F.

Cooling Equipment

Containers used for cooling are principally oblong, galvanized metal livestock watering tanks, oblong steel tanks on castors, galvanized sheet metal tanks mounted on legs (figure 12), wooden casks, and barrels (figure 13-a), converted oil barrels (figure 13-b), and occasionally a



Figure 12. - A metal, rectangular cooling tank is used in many plants.



Figure 13. - Cooling receptacles used in one plant: (a) wooden barrel, (b) steel barrel, (c) farm milk cooler.



Figure 14. - This movable rack for dry-cooling or draining has a capacity for 180 birds.

farm milk-can cooler (figure 13-c) half full of water and refrigerated by an enclosed sulphur dioxide unit. Two farm plants with cold-room facilities cooled New York dressed birds on regular cooling racks overnight (figure 14). Next morning those sold as New York dressed were packed for shipment and those ordered drawn or eviscerated were taken to the drawing room.

While most authorities recommend that birds be cooled to below 40° F. within 4 hours after killing, the time of cooling at the plants visited is often a matter of convenience. Chickens not delivered to the buyer immediately after

dressing are left in water until the operator is ready to draw them or they are delivered as New York dressed birds. Some operators add ice to the cooling water, especially when the natural temperature of the water is above 60° F. Birds not delivered within a few hours are packed in ice in either insulated cabinets or in the delivery containers.

Drawing and Eviscerating Equipment

Among the farm plants, home-made, wooden-top tables are commonly used for drawing (figure 15). Some such tables had the top sloping from the front to a gutter in the back, and others have a gutter in the center. The latter usually have a water pipe with faucets for each person to rinse the bird and the giblets at time of drawing. A few use running water to assist in moving viscera to a perforated waste can, from which the water drains into the sewer. At other plants waste cans are conveniently placed for receiving viscera, and the soluble matter is washed directly to the sewer from the table top.

Larger plants use tables of similar design with or without running water but with tops of galvanized iron or stainless steel. Where these tables are not fastened to walls or floor, the usual connection from the water supply to the pipe line over the table is made with a piece of hose.

A convenient eviscerating table is approximately 72 inches long by 30 inches wide and from 30 inches to 38 inches high, made entirely of stainless steel, and equipped with a slightly raised waste disposal hole in reach of the 2 to 4 workers that this table accommodates. Sinks,



Figure 15. - At this plant a large wooden table was used for drawing poultry.

approximately 18 inches long, 9 inches wide, and 6 inches deep, are located at the ends as shown in figure 16.

Another type of stainless steel table has a gutter in the center and two waste disposal holes (figure 17). Adjustable spray nozzles are connected to a water line down the center, about 24 inches above the gutter, to supply water to each worker. These table tops slope slightly towards the gutter and accommodate up to 6 workers, depending upon the length of the table. Waste cans are placed under the disposal holes and the gutter drains to the sewer. Another type of drawing table has a flat-rimmed top containing 1 full-length perforated tray and 5 individual trays for work spaces and 7 adjustable spray nozzles for rinsing birds (figure 18).

Drawing was the customary practice of most plants visited though some actually did put the birds in ready-to-cook form. Drawing can be done



Figure 16. - Metal eviscerating table with sinks and rinsing faucets



Figure 17. - Drawing poultry on a metal eviscerating table with center gutter and washing faucets.



Figure 18. - Metal eviscerating table with individual trays and adjustable sprays.

more rapidly and with less care than preparing the ready-to-cook product and less equipment is needed.

While ready-to-cook poultry is usually prepared by hand with the aid of special hand tools, 2 of the plants visited used commercial eviscerating machines. In operating these machines the crop, windpipe, and gullet of the bird are removed by hand and the vent loosened leaving an opening sufficiently large to permit the removal of the viscera. The bird is then

secured on the machine and a plunger, enclosed within a sheath, is inserted from the front of the bird. When the sheath and plunger have entered the body cavity, 4 specially shaped fingers or spoons are released. One of these spoons follows the contour of the spine and scrapes out the lungs and kidneys while the others surround the viscera. In the process the entire mass of viscera is pushed through the posterior opening.

Cooling After Drawing

Nine plants studied submerge birds in rinsing tanks for a short time after picking. They are then taken from the tanks as needed for dressing, re-pinned, and drawn while warm. In most instances the carcass is again rinsed in running water from overhead faucets and placed on hooks to drain or placed on sorting tables without further cooling except as it is either packed in iced cabinets or in refrigerators for storage. Some plants which draw warm birds submerge them in a tank of water, or ice water, until packed for delivery. In some such instances the giblets are held in water while the birds are chilled and rinsed and then wrapped in wax paper and placed in the body cavity prior to wrapping or packing for delivery. The practice of submerging drawn birds in a tank of unchlorinated water is objectionable because of the possibilities of contamination not only of the exterior but particularly the interior of the birds.⁸

Many small plant owners show little concern as to the effects of high temperature scalding, plumping, slow or inadequate cooling, or the result of placing drawn birds in tanks of ordinary water on the appearance or keeping quality of the product. The reason for this probably is that these birds are usually consumed within 48 hours after killing and, therefore, do not show spoilage in that short period of time. However, the plants which dress for freezing or for holding for a longer period are more careful about the appearance and keeping quality of their product.

Many operators maintain that it is easier to draw or eviscerate chilled birds than warm birds. The hands and knives not only become greasy from the warm fat, making it difficult to hold or handle a bird, but the viscera and flesh are more flabby. This is particularly true in drawing fat hens. Others maintain that the drawing of chilled birds is more difficult.

It is advisable to remove animal heat in all carcasses as quickly as possible in order to retain the flavor and quality of meat. When birds are cooled before drawing, any contamination in cooling water from other birds placed in the same tank is chiefly on the exterior. Drawn birds should be washed after drawing in fresh, running, or chlorinated

⁸Research work recently done by the Poultry Branch of the Production and Marketing Administration of the U. S. Department of Agriculture, in cooperation with the Nebraska College of Medicine, has revealed that marked reduction in bacterial counts and improved sanitation can be effected in poultry plants by the use of residual chlorine in the processing water, and by the use of certain equipment and techniques.

water. They should not be placed in a tank for cooling because the open body cavity offers a very favorable area for contamination.

Perhaps the chief advantage of drawing warm is that it permits a continuous operation from killing to the finished product. Plants supplying poultry for immediate home consumption often pack the warm-drawn birds in ice for delivery and do no previous chilling. When birds have been chilled to 40° F. before drawing, a few workers have complained of cold hands from handling the cold birds.

Holding Equipment

Show cases and other insulated cabinets, cooled either mechanically or by crushed ice, are commonly used for holding dressed poultry. The ice-packed containers are so constructed that as the ice melts the water drains off. At some plants the birds are received in tanks on castors from the processing room, sorted for size, then packed in crushed or flaked ice in the shipping containers. Unless these full containers are for immediate delivery they are usually stored in a cold room ready for delivery the following morning.

WRAPPING AND PACKING

The birds from farm plants usually are individually wrapped in paper and are often sold to customers either at the plant or from roadside markets. Local telephone orders are often delivered to homes within an hour. These require no ice. Wholesale orders, requiring a greater period of time before delivery, are ice-packed. A common method of packing is in sugar or similar barrels lined with heavy butcher paper with the birds packed in crushed or flaked ice. When filled, the barrel tops are covered with paper and burlap for insulation and securely tied. For smaller orders delivered locally, orange crates, bushel baskets, and various types of boxes lined with parchment paper, waxed paper, or butcher paper are used. Usually when poultry is frozen for locker storage the birds are packed in a special moisture-proof, lined, cardboard box, and sealed. Eviscerated turkeys are usually placed in a cellophane or plastic bag, sealed under vacuum, and often then enclosed in a stockingette before freezing. In some instances when express or parcel post shipment from cold storage is made, the frozen bird is enclosed in an individual, corrugated, cardboard box, usually with a piece of dry ice at the bottom and top, and the box sealed.

SANITATION

Many operators of large poultry plants realize that many of the dressing practices common in the industry are not desirable from a sanitary standpoint and need to be corrected. Many of the small plants studied fail to meet even moderately strict sanitation requirements. Many lack satisfactory cleanliness, lighting, and ventilation. Poultry dressing plants are likely to attract insects, rodents, and harmful bacteria because of the combination of moisture, heat, and offal. For this reason unusual care is necessary to keep them clean and sanitary as to

plant and equipment, personnel, and operating practices. Some States are now passing, or more strictly enforcing, sanitation requirements pertaining to such plants. The Federal Government has set up regulations and sanitation requirements for poultry dressing plants whose products carry the U. S. Department of Agriculture grades or move in interstate commerce.⁹

Some States and local municipalities have laws and regulations which require poultry processing plants to obtain a license or permit to engage in the business of processing poultry. These laws are primarily designed to establish and maintain certain sanitary standards with regard to construction, equipment, and operating practices. For information pertaining to such regulations, contact the State Departments of Agriculture or Health and local health or sanitary authorities.

DESCRIPTION OF INDIVIDUAL PLANTS

Scale floor plans of several of the farm and small commercial dressing plants studied are shown and brief descriptions given in this chapter. These plants were selected as more or less typical of the plants because of the equipment used, plant layout, and operations. The plans are for 5 types of plants: (1) Typical farm plants, (2) farm basement plants, (3) typical small commercial plants, (4) plants with conveyors, and (5) locker plants.

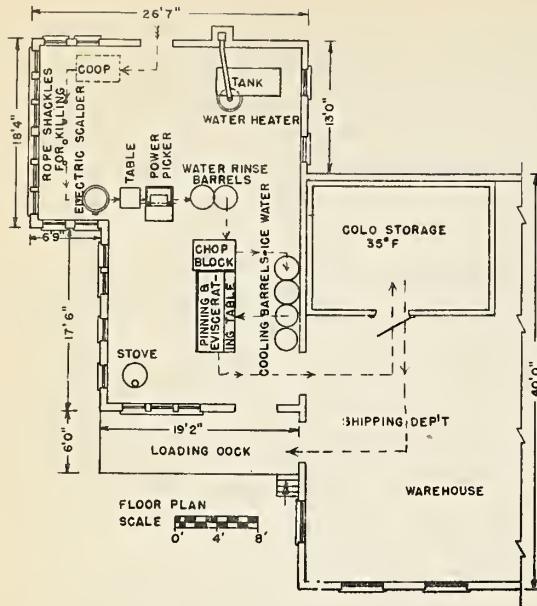
TYPICAL FARM PLANTS

Plants 1 and 2, representative of chicken dressing plants of the type found on farms, show the equipment used and flow of poultry.

Plant 1 uses ropes suspended from the ceiling for hanging the birds in groups of two to four at a time. The birds are bled and scalded as a unit by one worker. Another worker operates the picker and a third pins and draws the birds. The rough-picked birds are placed in a barrel for rinsing and then removed for further pinning and drawing. Next they are submerged in ice water in barrels for chilling. When the two workers have dressed the day's kill, they clean up the dressing section of the plant and assist the third man in drawing. When the required number of birds are drawn, these, and the birds to be sold as New York dressed, are hung on racks, dried, and cooled in the 35° F. cooling room shown preparatory to wrapping or packing for delivery.

⁹In addition to complying with the State and local regulations as to minimum sanitary requirements, plant operators may find it to their advantage to adhere to requirements as follows:

1. Sanitary Requirements for Dressed Poultry Plants under the Federal Food, Drug, and Cosmetic Act. (See Appendix)
2. Suggested Sanitary Standards for Poultry Plants. Institute of American Poultry Industries, 221 N. LaSalle St., Chicago 1, Ill.
3. Regulations Governing the Grading and Inspection of Poultry and Domestic Rabbits and Edible Products Thereof and United States Specifications for Classes, Standards & Grades With Respect Thereto. Production and Marketing Admin., U. S. Dept. Agric., Washington, D. C.



Plant 1. - Farm. Normal output (chickens per hour): 92 dressed - 3 workers, 69 drawn - 3 workers.

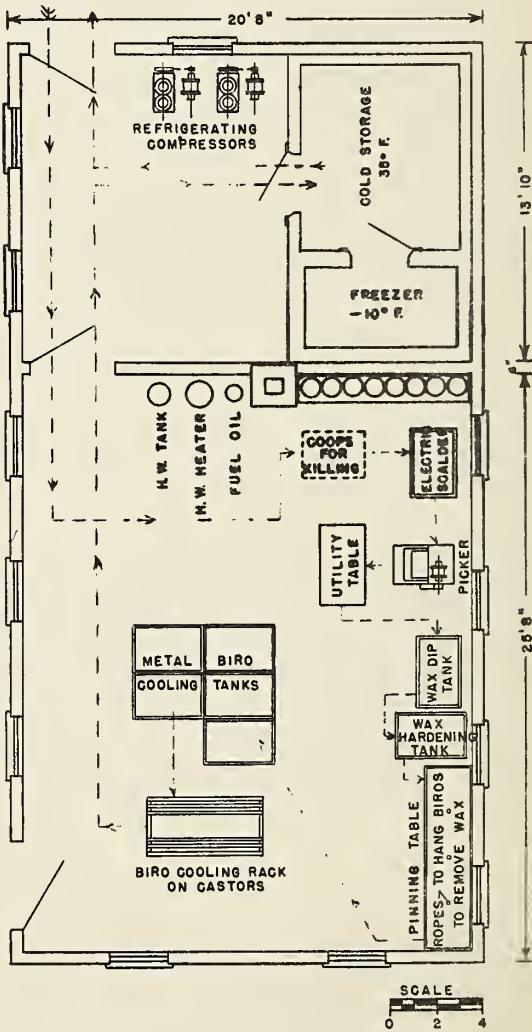
table where the wax and adhering feathers are removed by two women workers. The remaining pin feathers are then removed by hand and the birds water-cooled in metal tanks. They are then hung, on racks (figure 14) allowed to dry at room temperature and placed in a 35° F. room for holding overnight. Birds to be made ready-to-cook are taken to the sales-room in another building and eviscerated.

The plant has an automatic hot-water heater to furnish hot water for the scalding. This eliminates wide fluctuation in the water temperature and also reduces the amount of electricity required to maintain the proper temperature.

FARM BASEMENT PLANTS

Plant 3 is one of the better plants located in basements of farm homes in the Northeast and is shown because of its convenient layout for handling birds through the processing operations.

The floor plan and equipment of plant 2 is shown chiefly because this is the only farm plant surveyed which uses wax in dressing. One man bleeds the chickens in funnels fastened to the wall, scalds and places them on the utility table within reach of the picker. The picker removes about 75 percent of the feathers on the mechanical picker and then dips the birds into the tank of melted wax. From the wax tank the birds are dipped in ice water to harden the wax, and placed on a

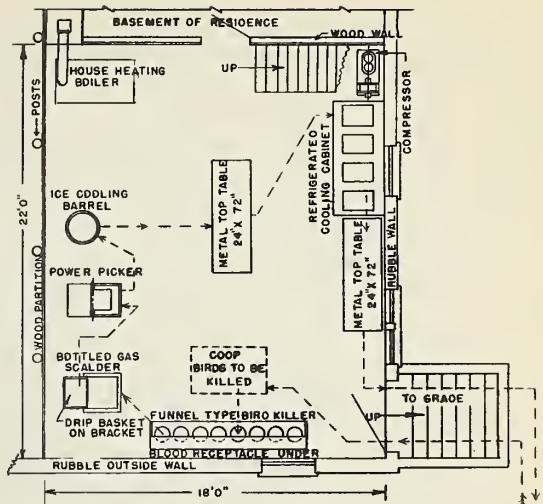


Plant 2. - Farm. Normal output (chickens per hour): 60 dressed - 4 workers, 25 eviscerated - 1 worker.

However, unless basements have sufficient windows for adequate light and ventilation and have sewer drainage, basement plants are not recommended. Live birds must usually be carried from the driveway (sometimes very inconveniently located) down the stairs to the basement room. Empty coops and dressed poultry must then be carried back up to the driveway.

The plant operations are generally similar to other types of farm plants. In this plant, an 8-funnel kill-bleed stand is used. The operator removes 4 bled chickens at a time from the funnels and scalds them in units of 4, keeping a uniform flow of birds to the picker.

Before removing the next unit of birds from the funnels, he refills the 4 empty funnels and kills this new 4-bird unit. By the time he has scalded 1 unit, the remaining unit in the funnels has had time to bleed thoroughly. This can be operated also as a 2-bird unit, whereby 1 operator kills, bleeds, scalds, and picks. A long funnel stand permits an increase or decrease in capacity by using such numbers of funnels as the rate of dressing requires.



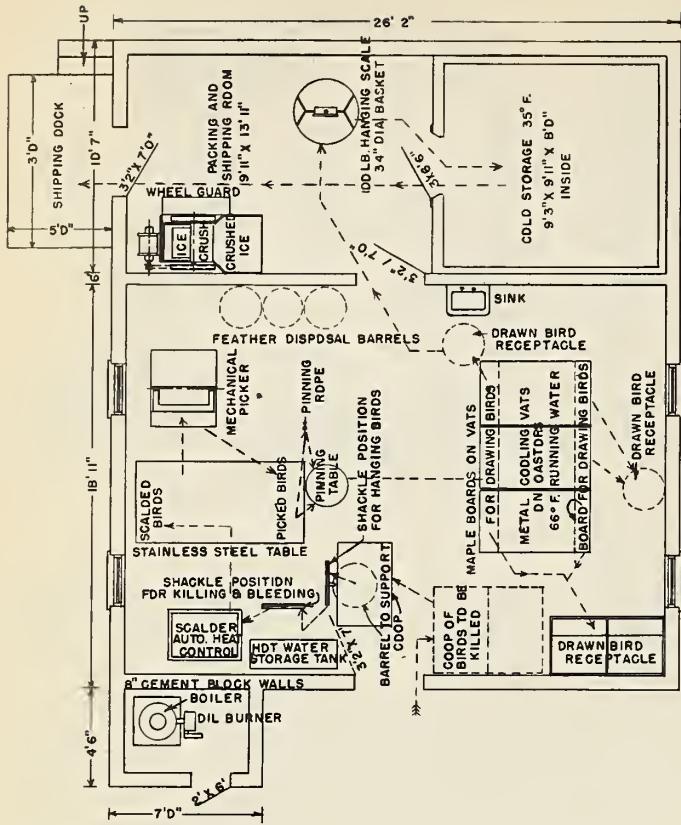
Plant 3. - Farm. Normal output (chickens per hour): 40 dressed - 3 workers, 25 drawn - 3 workers.

TYPICAL SMALL COMMERCIAL PLANTS

Plants 4, 5, 6, 7, 8, 9, and 10 are representative of the 23 small commercial plants studied; they show considerable variation in layout, equipment, and operation.

At plant 4 a workman hangs 12 chickens by 1 foot each in a double 6-unit shackle (figure 3). The shackle is then hung on a hook, suspended from the ceiling near the scalder, for killing and bleeding as shown on the drawing. The 12 birds are scalded as a unit at a temperature of about 130° F. They are moved back and forth in the water by hand for a period of approximately 2 minutes, taken out of the scalder, removed from the multi-bird shackle, and placed on a table conveniently located for both the scalder and the picker. After having been picked on a drum picker, the birds are placed on a table and 2 men, 1 of whom is the foreman, do the pinning. Due to the skill of the picker and the condition of the poultry, many of the birds need little hand-pinning. The finished birds are transferred at intervals to a board mounted on a cooling tank where the heads and shanks are removed before chilling (figure 12).

Three iced cooling tanks are filled consecutively. The birds remain in each cooling tank from 3 to 4 hours. The birds are dressed in the morning and drawn in the afternoon. All workers participate in both the



Plant 4. - Farm. Normal output (chickens per hour):
250 dressed - 5 workers, 448 drawn - 5 workers.

through the plant by helping each other when someone gets behind. All employees are experienced and highly skilled in dressing poultry. The plant is one of those visited whose drawing rate was greater than that of dressing. In this instance this may be accounted for in part by the practice of removing the head and shanks during the dressing process.

Some noteworthy features of plant 4, in addition to the apparent high labor efficiency, are:

- (1) An automatic oil-fired boiler with water level control required only periodic attention of the foreman.
- (2) A hot-water storage tank, steam heated with automatic temperature control, was used for scald water replacement and for plant cleaning.
- (3) A 100-pound hanging scale with 34-inch diameter metal basket in which 40 birds are weighed at a time. A duplicate weight slip is attached to each metal box when packed.

On the drawing of plant 4, the entrance for coops of live birds appears crowded. However, the space between the cooling vats and the entrance is not used during the dressing operations, and it accommodates a large number of coops containing live birds for killing. The empty coops are placed outside as the birds are removed. All equipment in the plant is

dressing and drawing operations. Cutting boards are mounted on the rim of the cooling tanks, with containers nearby for the drawn birds and the offal. Forty birds are weighed and packed in each of the iced, metal shipping boxes. The boxes are then placed in cold storage overnight for delivery by trucks the next morning.

The sales outlet is principally through retail stores owned by the plant operator in nearby cities. Some poultry is sold to local night clubs.

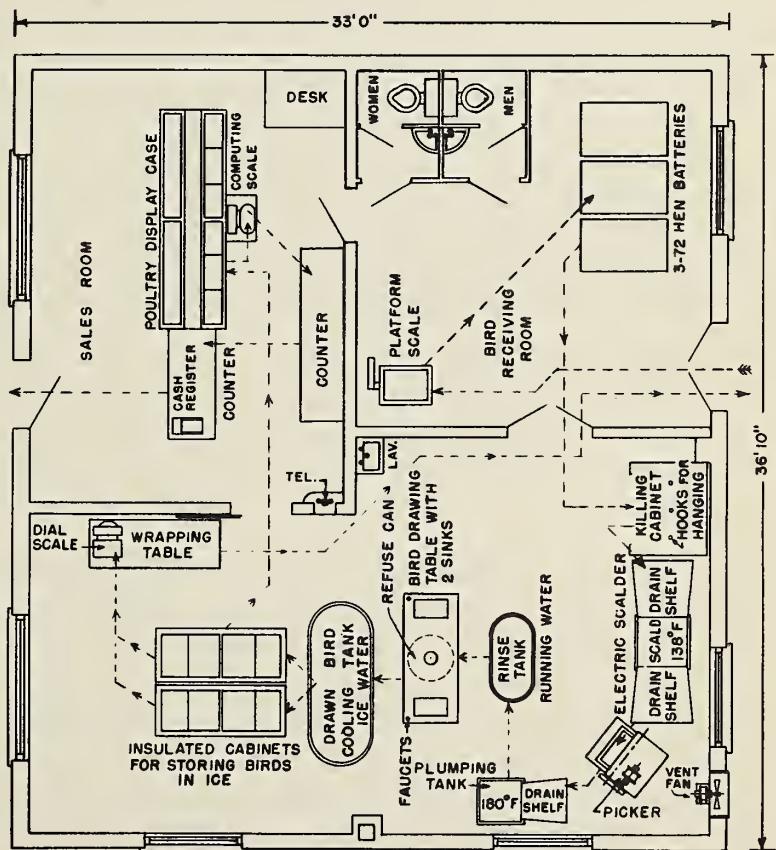
Time checks made at plant 4 over a period of 8 hours show a dressing rate of 250 and a drawing rate of 450 birds per hour, operating with 5 employees including the foreman. During the processing operations the crew prevents delays in the continuous travel of birds

conveniently arranged for a minimum of walking from one operation to another. In most instances workers merely have to reach for the next bird.

At plant 5 live birds in coops are weighed on portable scales in the receiving room and the live cooped birds are stacked in front of the killing and bleeding cabinet (figure 7-a). One helper kills, scalds, picks, plumps, and places the birds in a rinse tank. The owner pins, draws on table (figure 7-f) and then places the drawn birds in a cooling tank (figure 7-g). The birds are handled in units of 4, hung in a slip-noose over 1 of 3 hooks attached to an angle iron across the top of the killing cabinet (figure 7-a). As each bled unit is removed to a shelf attached to the scalding (figure 7-b), another unit is hung and killed. With this procedure the killing cabinet contains 2 units, or 8 birds, at all times. The birds are scalded in pairs and laid on a drain shelf at the opposite end of the scalding (figure 7-b). They are then picked (figure 7-c), plumped (figure 7-d), and deposited in a rinse tank (figure 7-e) one at a time. The plant is well arranged for increasing or decreasing capacity merely by increasing or decreasing the number of workers.

Plant 5 is located in the outskirts of a city of 300,000 population on a main highway and has a sizeable parking lot in front. The live poultry batteries shown on the drawing are used only when necessary to hold birds over Sunday. A steam boiler in the adjoining building furnishes steam to unit heaters for heating the plant. Were it not that a large percentage of sales is made through the salesroom, some interference would be expected in shipping dressed birds and handling the live ones through the one door to the receiving room.

Both the insulated storage boxes (figure 7-g) and showcase are ice packed and suitable



Plant 5. - Commercial. Normal output (chickens per hour): 40 dressed and drawn - 2 workers.

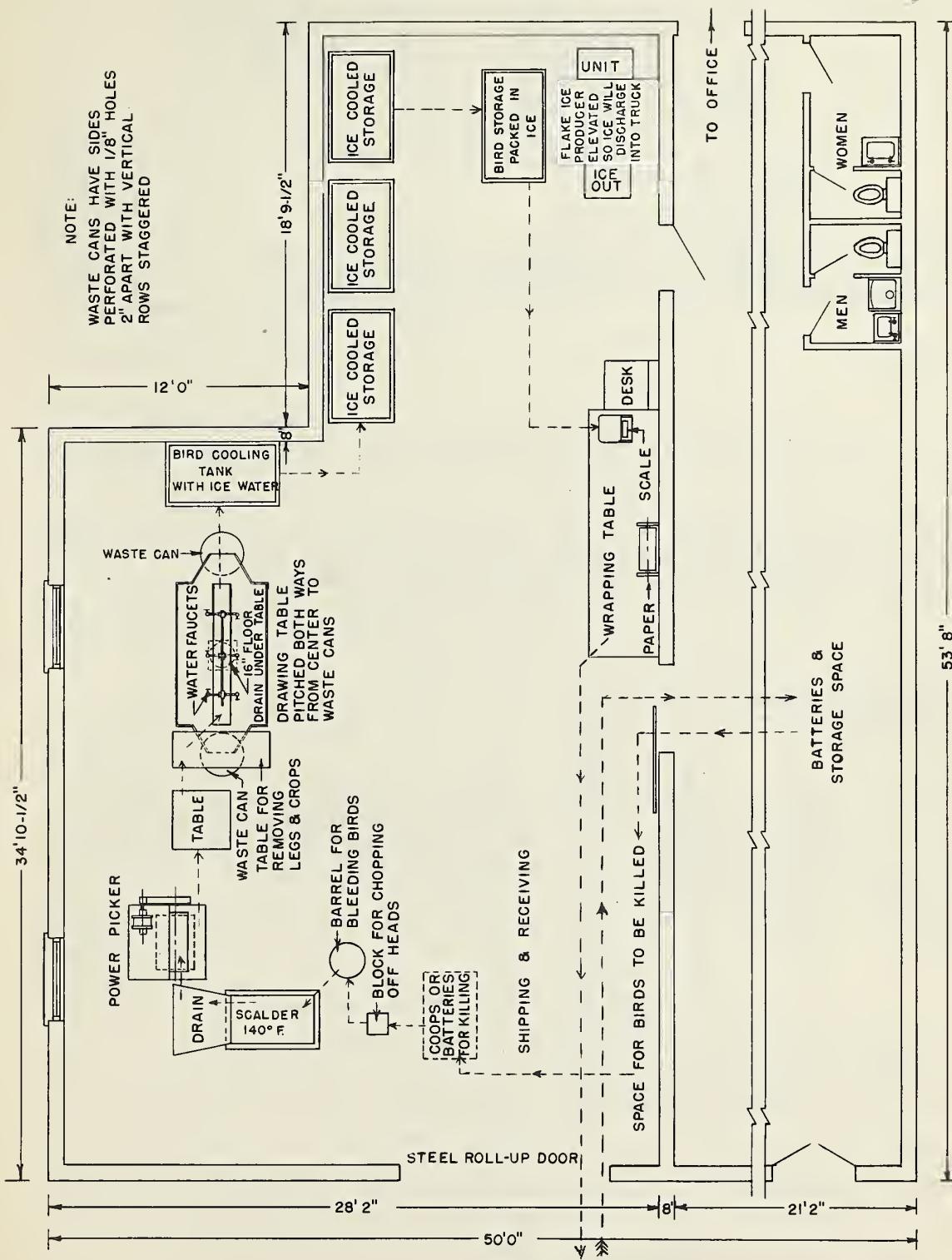
for a large volume of poultry. For increased capacity more insulated cabinets could be added. This is practically the only addition needed for an increase in capacity. The layout is a good example of a plant with some holding space and a salesroom.

The layout of plant 6 is shown chiefly because of the drawing operations. The drawing table is unique in that the metal top, bound by a short-coaming, slopes from the center to both ends. Six faucets are connected to a central overhead water-supply pipe, furnishing running water for rinsing the drawn birds and for flushing the offal into perforated waste cans through openings at the end of the table. With this arrangement the water drains to the sewer under the table, yet the offal is retained. Five women were employed in the drawing operation at the time of the visit. One drawback noted, due in part to the location of the table, was that 2 women had to supply birds to the other 3 by pushing them along a shelf over the center of the table. In turn, drawn birds are similarly relayed to the cooling tanks. The cleaned gizzards, hearts, and livers are placed inside the birds. Then the legs are trussed with a belted strip of skin from the opening through which the viscera is removed, and the bird placed in metal tanks containing ice-water.

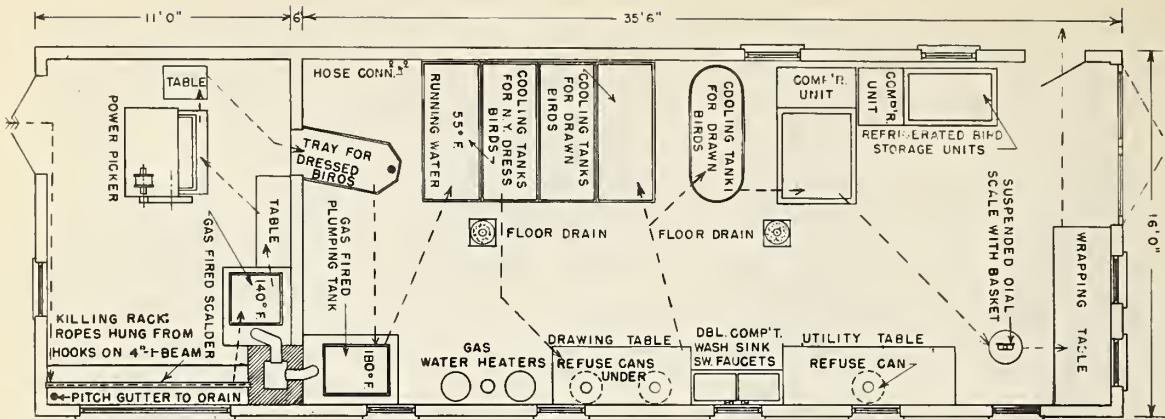
The ice machine shown in the drawing is self-contained with a refrigerated unit for storing flaked ice. This unit was reported to be convenient and economical. The only poultry storage containers used are steel tanks, mounted on castors, in which the drawn birds were ice-packed, breast down. As in the case of most small commercial plants, the birds are packed in paper-lined orange crates or similar boxes for local deliveries and in paper-lined barrels for more distant shipments.

This plant is located in a large city. The birds are obtained from as far as 300 miles from the plant. They are weighed and transferred from coops to batteries at the plants and the coops stacked for return to farmers by the truckers. The dressed poultry is sold chiefly to wholesalers.

Plant 7 is the only plant studied where a city health department requires a separate room for the killing and picking operations. The partition shown on the plan is in compliance with this requirement. Two men do the killing and picking. The killer also scalds the birds and places them on an adjacent table. The picker takes these birds from the table, picks them, and then deposits them on a tray through an opening in the partition. Two men in the adjacent room pin and plump the birds and deposit them in cooling tanks. Birds to be drawn are removed as needed, drawn, and cooled in other tanks. The cooled birds are washed in a sink, dried, and wrapped or packed for delivery. Birds held overnight are placed in a mechanically-refrigerated cabinet.

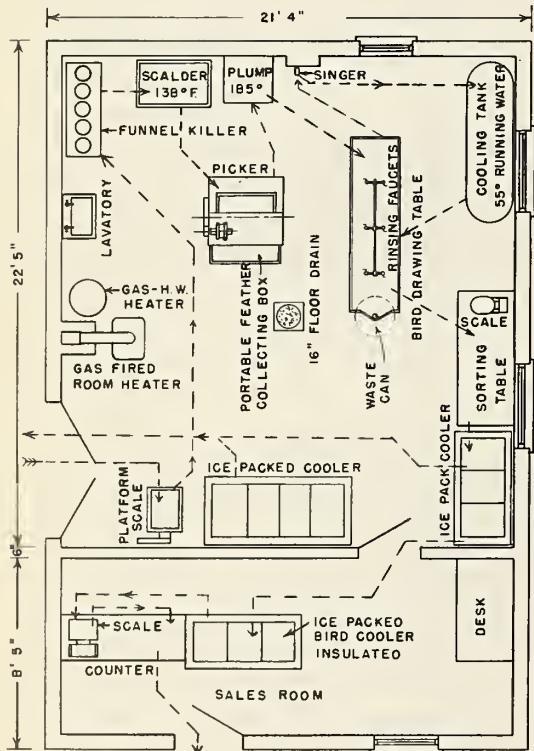


Plant 6. - Commercial. Normal output (chickens per hour): 225 dressed and drawn - 9 workers.



Plant 7. - Farm. Normal output (chickens per hour): 100 dressed - 4 workers, 50 eviscerated - 3 workers.

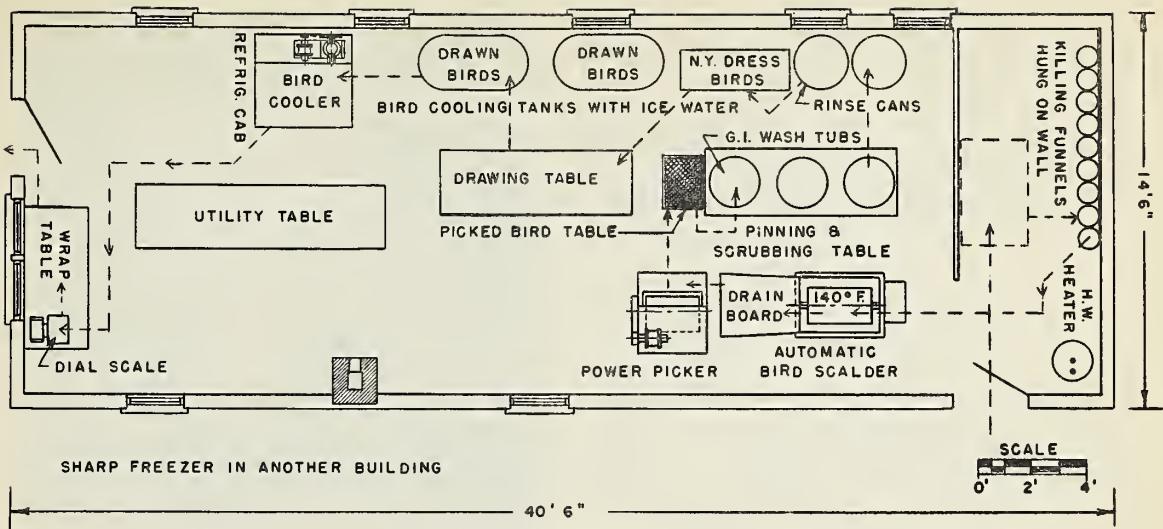
At plant 8, representative of commercial plants visited, the birds are plumped and drawn before cooling. The drawing table accommodated 6 women, each with a water faucet for rinsing poultry and for cleaning gizzards. The giblets are enclosed in the birds and their legs trussed with a belt of abdominal skin before the birds are placed in cooling tanks. At this plant each class of drawn birds is sorted and stored according to weight in the several sections of ice-packed coolers. A considerable portion of the poultry is retailed at the plant salesroom. Some is supplied to local hotels and restaurants.



Plant 8. - Commercial. Normal output (chickens per hour): 50 dressed and drawn - 4 workers.

The picking machine at plant 8 is fitted with a feather collector, (figure 10), which keeps the floor and drains relatively free of feathers. Only minor alterations of the picker were necessary to use the home-made collector. The sides of the collector fit between the picker drum and the side walls of the machine. The bottom rests on the floor under the picker fingers, supported on 3-inch diameter rubber-tired casters. At the end of the dressing operation, this collector is wheeled to the outside of the building and the feathers deposited in a trailer cart for hauling to a dump. The owner is well satisfied with the device and claims it saves cleaning time and greatly improves the cleanliness and appearance of the plant.

The unusual part of plant 9 is that the foreman kills, bleeds, scalds, and picks enough to keep 7 women



Plant 9. - Commercial. Normal output (chickens per hour): 120 dressed and drawn - 8 workers.

busy pinning, cleaning, and drawing. Nine birds here constitute a unit. While 9 bled birds are being scalded in an automatic scalding machine (figure 8) the foreman refills 9 funnels and kills these birds, leaving them to bleed while he picks the previous unit of 9 scalded birds on the drum picker. At this plant the killing and drawing of warm birds is a continuous operation. Most of the body heat is removed in ice-water after drawing. The birds held overnight are placed in a mechanically-refrigerated cabinet. Any birds frozen on order are especially wrapped in moisture-proof, refrigerator paper and placed in a sharp freezer in another building.

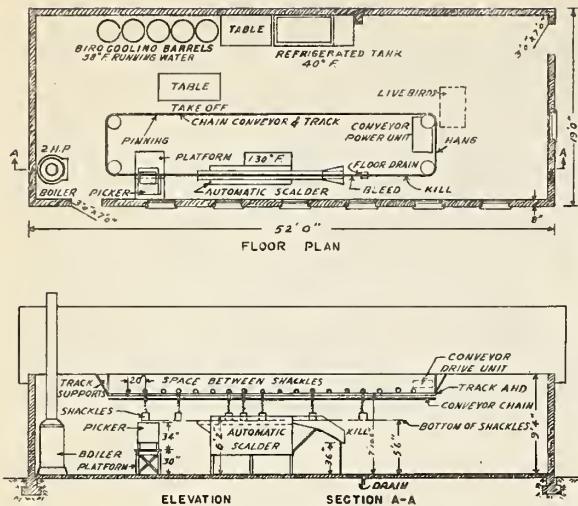
The movement of the birds during processing at plant 9 is planned so that the transfer of poultry from one operation to another is done by reaching - except the transferring of birds from the killing funnels to the scalding machine. Tables conveniently located between the scalding machine, picker, pinning tables, and cooling tanks speed up production by eliminating employee travel.

PLANTS WITH OVERHEAD CONVEYORS

Only 5 of the 48 dressing plants surveyed use any type of overhead conveyor line on which to hang the poultry during processing. Special attention was given to plants using conveyors because of the possible effect of their use on labor output.

Plants 10, 11, 12, and 13 illustrate the plants studied which use conveyors.

The conveyor in plant 10 was built by the owner with material generally available in farm-supply or hardware stores. The track (figure 19-a) is of the regular barn-door type from which barn-door hangers are suspended. Grain-binder type chain links are welded to hangers which



Plant 10. - *Plant. Normal output (chickens per hour): 180 dressed - 7 workers, 54 drawn - 3 workers.*

are spaced 20 inches apart in the endless chain to which regular shackles are attached. At each corner a sprocket wheel, such as is found on grain binders, is attached to track supports to carry the chain around corners. A speed reducer attached to a small motor is placed over the frame work, with another sprocket wheel meshing in the binder chain to motivate the entire chain. The chain travels about 5 feet per minute and moves the birds continuously through the killing, bleeding (figure 20), scalding, picking, and pinning operations.

The picking machine (figure 19-b) is mounted on a platform to enable the operator to pick the birds while shackled to the chain. The birds are then pinned as they move along. After pinning, the birds are removed from the shackles and placed in cooling barrels.



Figure 20. - *Sticking poultry in one of the few plants using an overhead conveyor.*



Figure 19. - *This plant uses an overhead conveyor (a) and a drum picker (b).*

The conveyor was installed primarily for dressing turkeys. With the installation of the track to hold the turkeys, women employees no longer complained about handling the heavy birds. If the scalder and track had been of the regular manufactured type and purchased new, the investment would have been high for the volume of birds handled. The conveyor does require considerable space. The same volume of poultry could be processed in less space with regular non-conveyor type of equipment.

About 90 percent of the volume of plant 11 are turkeys. The owners

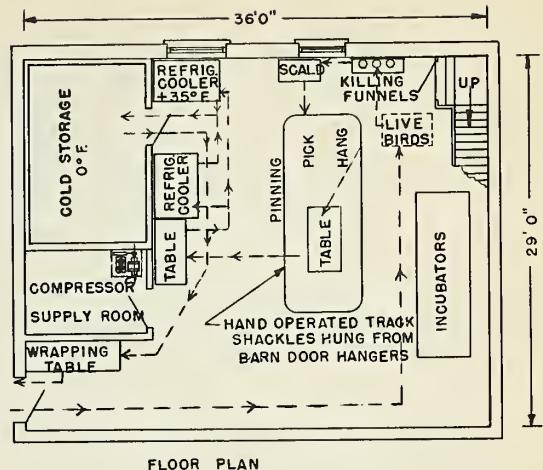
report faster and better work by the women employed as a result of the conveyor. The conveyor track, which is of the regular flat barn-door type, is supported from an overhead framework. Regular barn-door hangers are hung singly from the track and the hangers are moved along the track individually by hand. After the turkeys are killed, bled, and scalded, they are hung on shackles attached to the track.

During the picking and pinning process the finished turkeys are pushed away from the scalding by hand to make room for other turkeys.

Practically all turkey farm plants visited used this type of track and shackles, principally for the convenience of women workers. Drawing is done on the table shown in the floor plan of plant 11. A large percentage of the drawn birds at this plant are wrapped in cellophane, placed in stockingettes, and then frozen. The building was originally a cow-barn, located on a steep hillside. The chief objection to the layout of this plant is that the live birds and the dressed birds have to be moved through the same door.

In plant 12 a large suspended wheel serves to move chickens from the point where they are hung to the killer and then to the scalding. The killer also removes the tail and wing feathers. The wheel is about 9 feet in diameter and is equipped with 14 shackles hung on chains attached to the felloe (figure 6). As the birds reach the "take off" position, the operator of the scalding slants the shackle over the receiving basket and releases the bled bird from the shackle directly into this basket for scalding. One operator doing the scalding is able to keep two pickers busy. The entrance and shipping doors are conveniently located and very little employee travel is necessary between operations. This plant sold only New York dressed poultry.

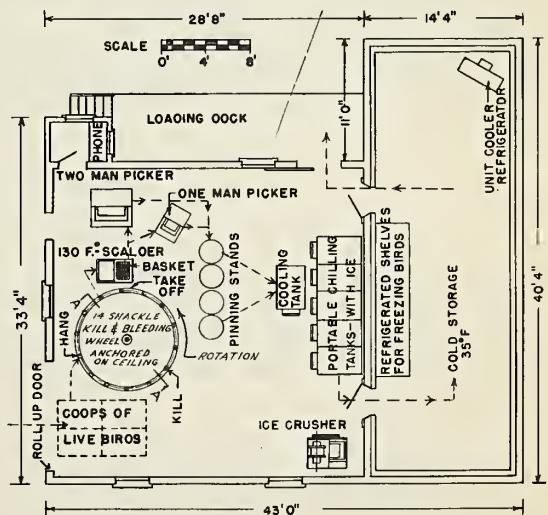
The floor plan of plant 13 is shown because of its convenience in receiving live birds and the location of the several pieces of equipment. Chickens are handled in pairs prior to pinning. For pinning they are hung from shackles suspended from a 1-inch galvanized pipe which is



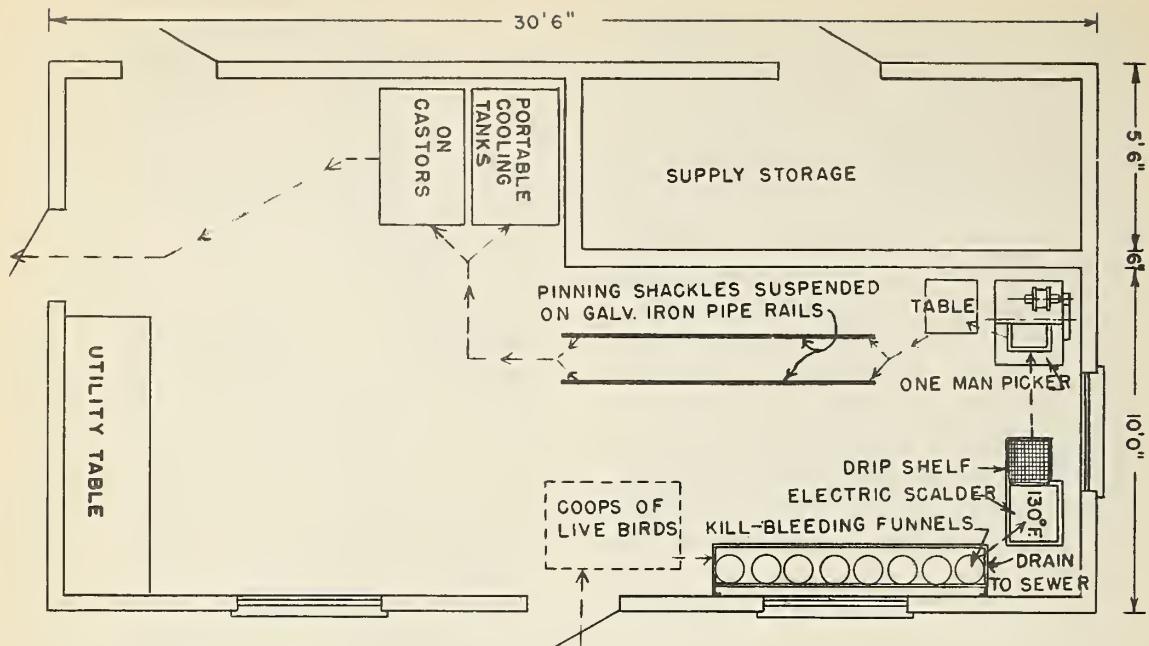
FLOOR PLAN

Plant 11. - Farm. Normal output (turkeys per hour): 33 dressed - 7 workers, 25 eviscerated - 2 workers.

Plant 12. - Commercial. Normal output (chickens per hour): 250 dressed - 9 workers.



Plant 12. - Commercial. Normal output (chickens per hour): 250 dressed - 9 workers.



Plant 13. - *Farm.* Normal output (chickens per hour): 100 dressed - 4 workers.

secured by chains hung from the ceiling. When the pinner falls behind, the scalding assists in pinning. The killer also adds scalding and picking to his work until the workers ahead catch up. Four workers, by helping each other, are able to New York dress 100 chickens per hour. After they are pinned, the shackled birds are pushed to the opposite end of the pipe conveyor rail until removed for cooling. This type of conveyor line, rod, or rail is used in other plants also. It is of various lengths and is used singly or in pairs and may be made of wire, pipes, rods, or wooden poles. Single movable shackles are hung on these rails. After being dressed the birds are iced in portable cooling tanks and wheeled to a roadside stand for sale, either as fresh-killed New York dressed, drawn, or cut-up poultry. The drawing and cutting operations are performed at the stand when requested by the customer.

FROZEN FOOD LOCKER PLANTS

Two dressing plants operated in conjunction with cold storage locker plants were included in the study, but neither was suitable for illustrative purposes. Under the chapter on suggested plans, a dressing plant set-up suitable for cooperative frozen food locker plant adaptation is described.

There are apparently splendid opportunities for dressing poultry by cooperative and other locker plants for the locker patrons and for marketing to patrons and others at many of the 11,450 locker plants in the United States.

Some locker plants now dress poultry for marketing to chain stores and wholesale outlets and employ a regular dressing crew. The extent of this business is often limited by the capacity of the plant, the availability of live birds, and market outlets. Poultry for sale at wholesale at the locker plants studied was New York dressed, although drawn birds were furnished when ordered. Birds processed for locker patrons were eviscerated, sometimes cut up, and packaged for freezing.

In the two locker plants surveyed, 85 to 95 percent of the poultry dressed were young chickens. Of this, one plant eviscerated 85 percent and the other 100 percent. These plants dressed poultry from 3 to 8 hours a week during about 50 weeks of the year.

The 2 plants used the continuous system with 2 men killing, scalding, and picking, and 3 women pinning and eviscerating preparatory to wrapping and freezing. The operator of the picking machine at a locker plant is often a regular employee whose time is divided between poultry dressing and other locker plant duties. He may dress poultry alone or may be assisted by other employees, permanent or temporary, depending upon the volume of birds to be dressed.

SUGGESTIONS FOR DRESSING PLANTS

There are a number of basic factors to be considered in establishing a poultry dressing operation. Among these are source of poultry, finances, plant location, type and supply of labor, availability of public utilities, sanitation requirements, and sales outlets. In this report no attempt has been made to discuss all these factors in detail, but a number of them has been touched upon.

The suggestions made in this chapter pertain essentially to the utilization and adaptation of the findings in the study of the plants discussed earlier in this report. In this chapter an attempt has been made to synthesize into four, individual, model plants the best physical features found in all the plants studied by combining them into plans for (1) a farm plant, (2) 2 types of small commercial plants, and (3) a locker plant.

GENERAL CONSIDERATIONS

Plant Location

After a prospective operator determines that an ample supply of poultry is available either from his own production or from outside sources and that suitable market outlets are available or can be developed, the next step is the location of the plant.

If the plant is to be a farm plant it will usually be located on the farm and at the farmstead. If it is to be a small commercial plant, the town or city of location and the location within that town or city is important. Villages and small towns may have some advantages over cities with regard to site costs, availability, dependability, type of labor,

labor rates, nearness to source of poultry, and lack of restrictions. The rate of labor turnover is often less in small centers of population due to the lack of alternative employment. Larger population centers may have advantages in sales outlets; public utilities such as water, gas, electricity, and sewage disposal; and supply of labor for operations requiring a considerable number of workers.

The plant site should be convenient to roads or driveways so that trucks bringing in live poultry or delivering finished products can load and unload at the plant door. In the country, a good well, located close to the building, if possible, is of great importance. Protection from contamination from barns, outbuildings, and sewage is important. Plant sewage should have a natural fall, with the pipes laid below frost level to the septic tank and disposal bed. The disposal bed should be in sandy soil. If the operator plans to sell poultry from a city plant at retail, the site selected should be convenient to residential districts. If possible, ample parking space should be provided for patrons coming in automobiles. It should be located in front or at the side of the building. It should be separated from the rear of the plant by a fence or hedge to avoid interference between customer and plant traffic.

Plant Cost

The cost of a poultry dressing plant will depend upon a number of factors among which are size and capacity, type of construction, amount of machinery and equipment, and the type of cooling or refrigeration used. For plants that are operated only a few days a week, and whose output is small, it is more important to keep the cost of the facilities low than in larger plants that are more fully utilized. Types of construction which are flexible, sanitary, and of relatively low cost are recommended.

As shown earlier in this report, the average investment in buildings for 20 farm plants was \$2,565 and for 21 small commercial plants \$6,357. The average cost of all machinery and refrigeration equipment, including trucks, was \$2,564 for the farm plants and \$4,058 for the small commercial plants. This made a total average investment, not including the cost of the site, of \$5,129 for the farm plants and \$10,415 for the small commercial plants.

The investment in machinery and equipment in a new plant should depend in part upon the size and nature of the operations and the importance of poultry dressing as a source of income compared with other enterprises. The advisability of the purchase of expensive items of equipment, such as an automatic scalding, for a small farm plant operated with family labor on a part-time basis, is questionable. Plants designed for full-time operations, especially with hired labor, would normally warrant more labor-saving equipment.

The machinery listed for the plants suggested below is suitable for full-time operation and the total cost may be more than the average costs given above.

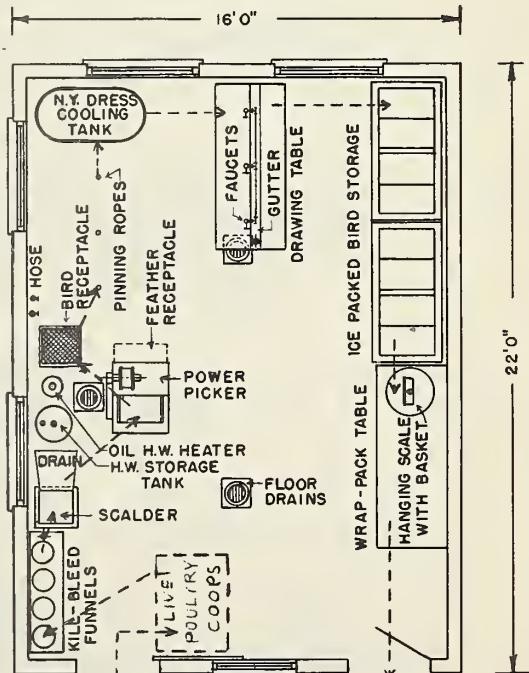
FARM PLANTS

Plan A shows a suggested layout for a farm dressing plant suitable for operation by a family or with a few hired helpers. Three experienced workers should be able to New York dress at least 60 birds per hour with such a plant and equipment. For greater production more workers would be needed. With a crew of 5, 1 worker would kill and scald, 1 would pick, and 3 would pin.

The room dimensions suggested are 16 feet by 22 feet. Machinery for the plant includes:

1. A 6-funnel, wall-type killing and bleeding stand.
2. An electric scalding tank with a heating element of at least 2,500 watts, drain shelf, and controls for temperature and water level.
3. A motor-driven picker with working width of at least 17 inches for young chickens, 20 inches for turkeys, and provided with feather and bird receptacles.
4. A hot-water heater and storage tank.
5. Pinning ropes or table as preferred.
6. A galvanized iron livestock watering tank at least 24 inches wide and 48 inches long for cooling New York dressed birds.
7. Metal drawing table with water supply and drain to septic tank.
8. Insulated ice-pack cabinets for holding dressed poultry.
9. A wrapping and packing table about 30 inches wide and 72 inches long provided with a basket-type hanging scale.

Sufficient working space is provided in this drawing around each machine and space at the killing end for several coops of live birds. The floor should be pitched to drain out of the path of workers. The equipment is so arranged that the birds are moved in a circular path from the point of entry into the building through the final processing with a minimum of walking for the workers.



Plan A. - Suggested layout for farm dressing plant - 2 to 5 workers.

SMALL COMMERCIAL PLANTS

Plan B shows a plan for a small commercial dressing plant in which 4 to 6 experienced workers should be able to New York dress from 150 to 250 birds per hour. If both New York dressing and drawing are done, the per hour output, of course, will be reduced. The plan provided ample space for each worker for crews up to 9 employees. Storage space can be added for supplies and feeding batteries, if needed, by increasing the length of the building from the 36 feet illustrated to 50 feet.

This layout does not include a sales room. However, some direct-to-customer sales can be made at the delivery door adjacent to the wrapping and packing table. The automatically oil-fired steam boiler suggested is for heating the buildings, heating the scalding water, and to furnish steam for cleaning and sterilizing the equipment. Space is also provided to house a delivery truck and for loading and unloading under cover. The chief sales outlet for such plants are usually wholesale buyers.

The equipment shown on this plan includes:

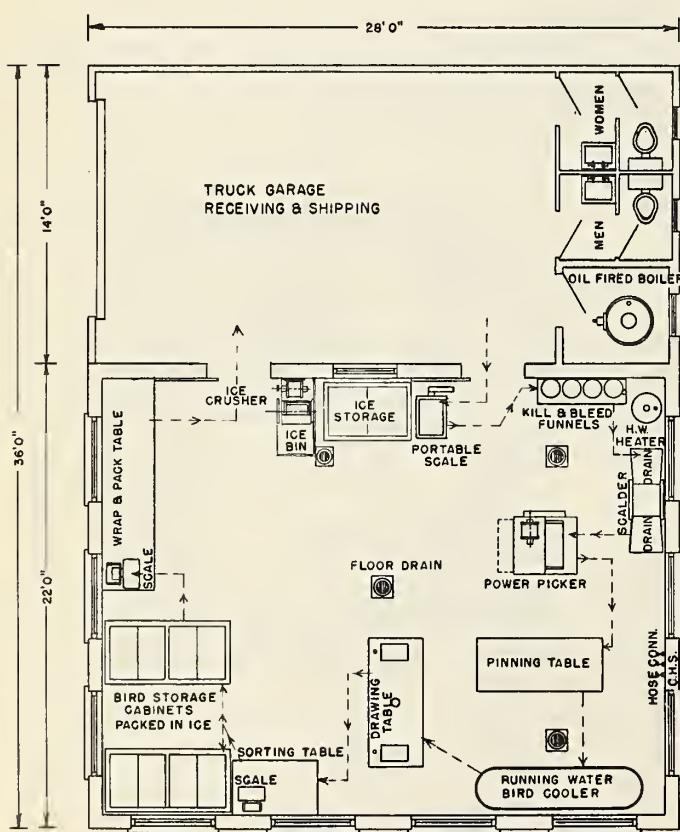
1. One 6-funnel, wall-type kill-bleed unit (for greater capacity substitute an 8-funnel size).

2. One 120-gallon hot water storage tank with thermostatic control.

3. Insulated scalding with steam coil or steam inlet with mixer mounted internally, submerged in the scalding water, and fitted with thermostatic heat control, water level control, overflow, and drain shelves.¹⁰

4. A picker with a working width of not less than 30 inches and equipped with feather collector and bird receptacle.

5. A 36 by 72-inch picking table with galvanized iron or stainless steel top or 6 pinning shackles suspended on chains from the ceiling.



Plan B. - Suggested small commercial dressing plant - 5 to 9 workers.

¹⁰ Owners with a preference for electrical heating units should purchase a scalding with two 2,500-watt heating elements fitted with thermostatic and water level control, or an automatic scalding similar to that shown in plant 9.

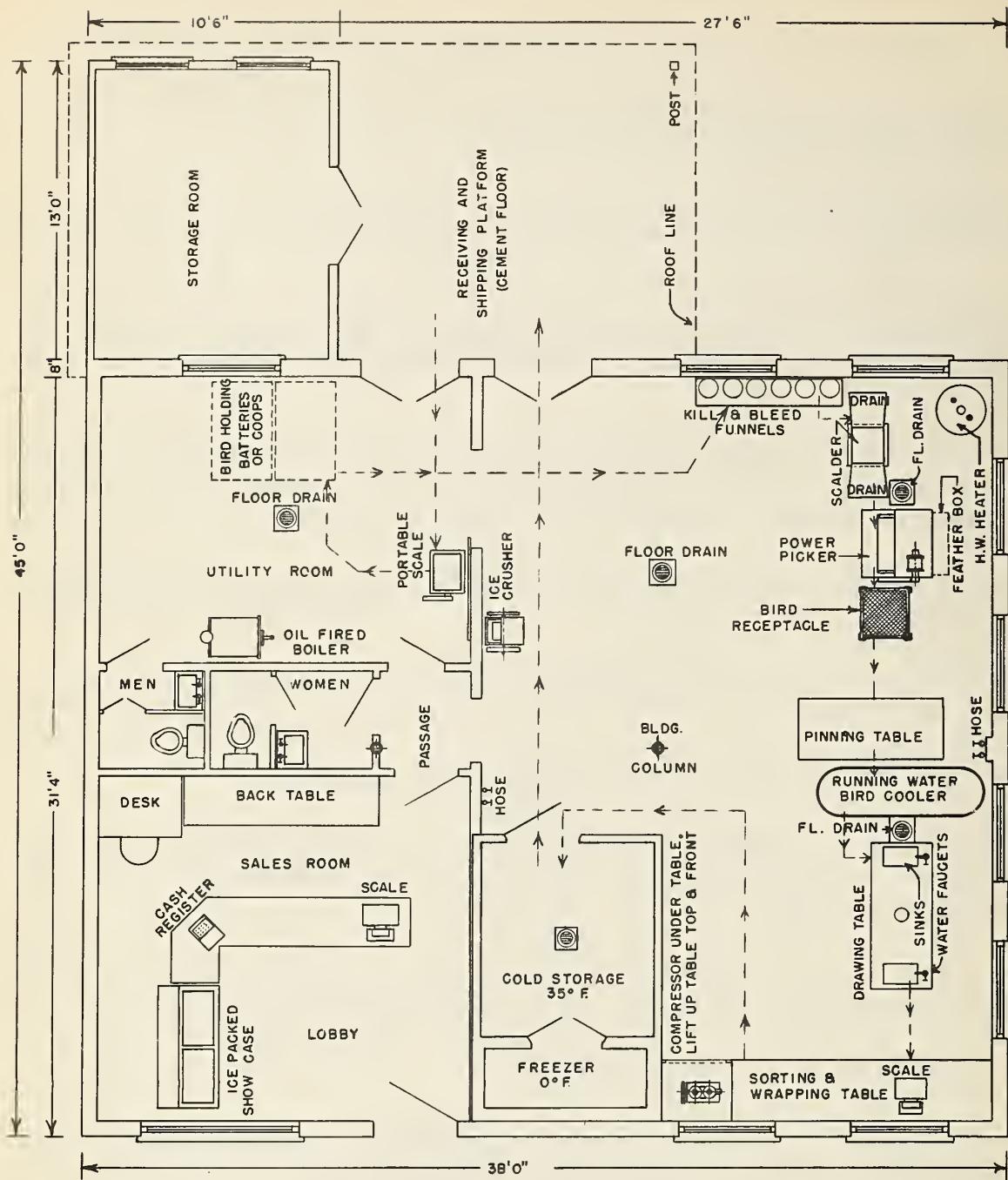
6. A 3-valve hose connection for hot water, cold water, and steam.
7. A standard metal livestock watering tank at least 24 inches wide and 96 inches long, fitted with drains.
8. A stainless steel eviscerating table which will accommodate at least 4 workers for drawing poultry as shown in figures 16, 17, and 18.
9. A metal top sorting table approximately 30 inches by 54 inches on which a scale is mounted. A basket-type hanging scale is often preferred as it can be hung in the space between the sorting and the drawing tables.
10. Insulated cooling cabinets lined and covered with metal, and raised on cross pieces for cleaning underneath. Each storage compartment accessible through a sliding panel on top.
11. A wrapping and packing table about 10 feet long by 30 inches wide, provided with computing scale.
12. An ice crusher with insulated storage bin for approximately one-half ton of cake ice.
13. Portable platform scale of 1,000 pounds capacity.

The layout of a plant is shown in Plan C, which has about the same equipment and dressing area as in Plan B, but in addition it has the following features:

1. Sales room and office where the manager or clerk can sell dressed poultry directly to customers and do office work.
2. Cold storage and sharp-freeze rooms.
3. Utility room for such purposes as weighing, receiving, temporarily holding live birds in coops, and feeding poultry in batteries when conditioning, fattening, or holding over weekends.
4. A storage room for extra coops, batteries, and plant supplies.

LOCKER PLANT

A cooperative locker plant processing poultry only for its locker patrons seldom processes more than a few hundred dressed and ready-to-cook chickens per day and the work is usually highly seasonal. Broilers and



Plan C. - Suggested commercial poultry dressing plant with cold storage and sales room - 5 to 9 workers.

fryers from farm flocks are usually ready for dressing during the late spring and summer months. Small commercial plants often process 1,000 or more birds per day and operate more hours with birds from broiler and other producers. In adapting poultry dressing operations to locker plants, the possibility of outside sales should be considered to determine the probable floor area and equipment needs. Equipment and operations are essentially the same as for a farm or small commercial plant.



Figure 21. - Suggested arrangement for dressing equipment: (a) killing funnels, (b) automatic scalding, (c) power picker, (d) bird receptacle, (e) bird shackled for pinning and singeing, and (f) singeing torch.

The locker plant will, of course, already have a chill room and facilities for cutting up, wrapping, and freezing.

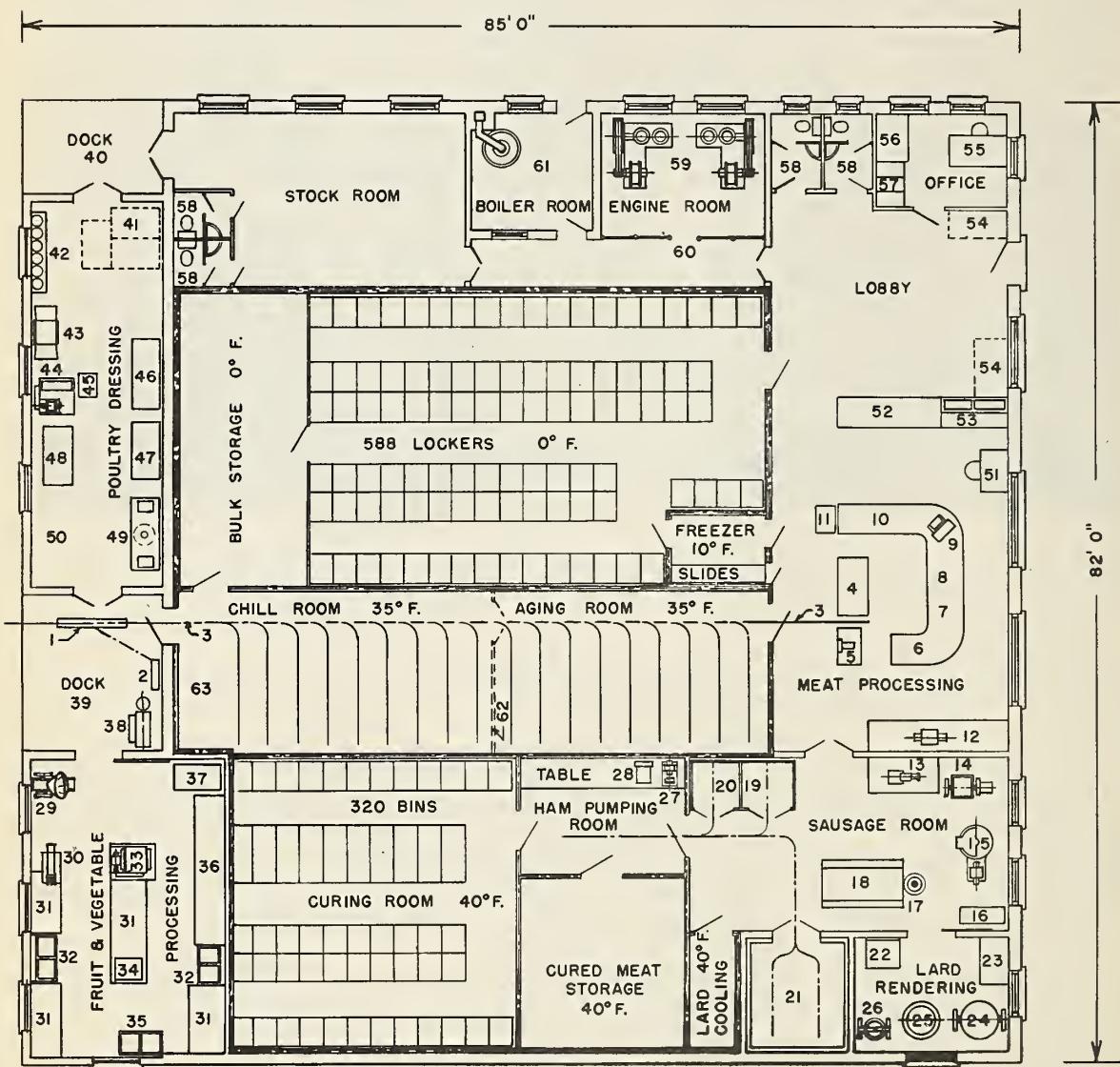
Since the daily volume of birds for locker plant patrons varies widely, the poultry dressing operations should be such that plant output can be increased or decreased merely by increasing or decreasing the number of workers. Such an arrangement is shown in figure 21. This means that equipment should be of sufficient size to handle maximum volume and conveniently arranged for either a small or large crew.

The floor plan of a locker plant including a room and equipment for poultry dressing is shown in Plan D.

The poultry dressing room is located at the rear of the building so as not to interfere with the other plant operations. Some plants where a poultry dressing room was not included originally have added a room or outside addition for poultry dressing.

The poultry dressing room shown is equipped for a New York dressing operation, ice-water chilling, and drawing or eviscerating. With this plan, New York dressed or drawn birds for immediate delivery may be processed without using any of the other locker plant facilities. Ice-packed New York dressed birds can be loaded out directly from the processing room.

The poultry may be drawn warm or after chilling. Chilling may be done either on racks (figure 14) in the regular chill room or in ice water. The eviscerated birds for locker patrons are transported to the meat processing room where they can be wrapped whole, or cut up and wrapped, frozen, and placed in the patron's locker by the locker plant employees.



Plan D. - Suggested plan for a locker plant processing meats, poultry, vegetables, and fruits.

CODE NUMBERS FOR IDENTIFICATION OF EQUIPMENT SHOWN ON PLAN D

Meat Processing

1. Overhead meat receiving track scale.
2. Receiving track scale beam.
3. Overhead meat track.
4. Meat chopping block.
5. Floor model power meat saw.
6. Bulk meat table.
7. Meat grinder can be mounted under table here, or mounted on table 12.
8. Meat cutting for freezer packages.
9. Computing counter scale.
10. Meat wrapping table.
11. Freezer truck.
12. Byproducts table.
13. Sausage grinder and table.
14. Sausage meat mixer.
15. Meat chopper.
16. Air compressor for sausage stuffer.
17. Sausage stuffer.
18. Stuffer table.
19. Sausage steamer.
20. Sausage cooler.
21. Smoke house with fire brick lining and overhead track.
22. Smoke generator.
23. Lard utility table.
24. Lard rendering kettle.
25. Lard cooling agitator.
26. Lard press.
27. Power ham curing pump.
28. Curing scale.

Fruit and Vegetable Processing

29. Green bean cutter.
30. Corn cutter.
31. Utility tables.
32. Two compartment sinks.
33. Washer-blancher-cooler (steam and water).
34. Steam peeler.
35. Lye peeler.
36. Wrapping and packaging table.
37. Freezer truck.

38. Pea sheller.

39. Meat and vegetable receiving dock.

Poultry Dressing

40. Poultry and stock room receiving dock.
41. Coops of live birds to be dressed.
42. Six-hole wall type poultry kill-bleed funnels.
43. Electric or steam heated scalders.
44. Poultry picker with 30" working width drum and feather collector.
45. 18" x 24" bird collector and drain table.
46. 30" x 72" pinning table.
47. 24" x 60" steel New York dressed cooling tank on wheels.
48. 180 bird steel poultry cooling racks on wheels (figure 21).
49. 30" x 72" stainless steel eviscerating table (see figures 13, 14, and 15).
50. Space for cooling tanks or racks.

Miscellaneous

51. Superintendent's desk.
52. Sales counter.
53. Refrigerated display case.
54. Frozen food display cases.
55. Manager's desk.
56. Office table.
57. Record files.
58. Toilets for men or women.
59. Refrigerating compressors and accessories. Condensers on roof.
60. Pipe guard rail and gate.
61. Oil fired vertical steam boiler.
62. Portable dividing partition.
63. Space for poultry cooling on racks.

APPENDIX

Requirements of Food, Drug, and Cosmetic Act
As Applied to Poultry Dressing Plants

The Food and Drug Administration has recently set forth the minimum sanitary provisions to be reasonably expected in a poultry dressing plant. It has set down the following points for the guidance of its inspectors:¹¹

1. The plant should be rodent-proof and free from rodents.
2. The plant should be screened or otherwise protected from infestation by flies and birds.
3. The plant should be free from roaches or other crawling insects.
4. There should be an adequate supply of cold and hot water and steam at all necessary points throughout the plant in order to facilitate adequate cleaning.
5. The plant should have smooth-surfaced concrete floors, with adequate drainage and impervious walls in the killing area to facilitate washing down of spattered blood and offal.
6. If there is no closed sewage system, offal and refuse should be adequately drained to a sufficient distance from the plant so as not to constitute a nuisance or attract flies and rodents.
7. Floors should be kept free of blood and vent and crop material, or washed down frequently enough so that this material is not carried about the plant on the feet of workmen or allowed to accumulate and decompose.
8. Ice to be used for cooling dressed birds should not be dragged across the floors.
9. Batteries should be kept reasonably clean.
10. The use of wax for defeathering involves a sanitation hazard. The wax is contaminated with blood, vent, crop material, and other filth. It is re-used repeatedly, sometimes for months, until it is a black, foul-smelling mass. The so-called "cleaning" procedures seen usually amount to no more than screening off the feathers and heating the wax. Some firms now de-feather satisfactorily without use of wax. Others are discarding the used wax sooner, and investigating other ways of facilitating removal of feathers from birds.

¹¹Food and Drug Administration. From talk delivered by Chester T. Hubble, Chief, Minneapolis District, at 58th Annual Conference North Central States Institute and Iowa Creamery Butter Manufacturers Association, Des Moines, Iowa, March 1, 1950.

11. Scalders should change water frequently enough to prevent accumulation of filth. Some firms are finding spray-type scalders apparently cleaner than scalding tanks, particularly when the water is not re-used repeatedly.
12. Milking of the crop and venting should be adequate.
13. Birds should be adequately washed after venting and cropping.
14. Mechanical roughers have been observed to force fecal matter from the vent into the feather follicles in the skin of birds. The roughers should be kept clean, and the birds should be washed thoroughly in warm water to remove excreta rubbed into the birds by the roughers.
15. Soaking tanks are likely to be the source of contamination of poultry. They are frequently so crowded that fecal matter is forced out of the birds, making the water filthy. Crop material also contaminates the water. Dirty ice is another source of contamination. Soaking tanks are a means for cooling birds, and as now used are not suitable for washing them. Some firms have substituted spray and scrubber-type washers and coolers, followed by air cooling, with marked improvement in the sanitary condition of the birds.
16. Dressed birds should not be passed through the room where batteries of live birds are kept.
17. Scales where cooled birds are weighed and bins where they are placed after grading should be kept clean.
18. Evisceration should be complete. Fecal contamination resulting from cutting into the cloaca should be removed by thorough washing. The birds should not be fouled by contact with the removed entrails.

The Federal Food, Drug, and Cosmetic Act forbids interstate traffic in foods which are adulterated. Food is considered adulterated if, among other things, it consists in whole or in part of any filthy, putrid, or decomposed substance, or if it is otherwise unfit for food; or if it has been prepared, packed, or held under unsanitary conditions whereby it may have become contaminated with filth, or whereby it may have been rendered injurious to health; or if it is in whole or in part the product of a diseased animal or of an animal which has died otherwise than by slaughter.

As applied to poultry, this means that the poultry killing and dressing plant must accept only live healthy birds, keep them in reasonably clean surroundings until slaughtered, bleed them sufficiently after slaughter, scald, de-feather, clean, and cool them in clean surroundings, in clean apparatus, eviscerate completely under sanitary conditions, and store them in a manner which will prevent subsequent contamination from insects, rodents, or birds.

