Poultry Processing Equipment
"Known Worldwide Since 1939"

Planning the Small
Poultry Processing
Operation

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PLANNING THE SMALL POULTRY PROCESSING OPERATION

I. Preliminary Ideas

A. Volume

The first step in planning is to determine as closely as possible the number of birds you will process each day or week. This estimate is highly important to the steps that follow. Generally speaking, broiler processing equipment may be grouped into 3 different capacity ranges:

Expected Volume:	Recommended System:
Under 50 birds a day	Drum Picker, AS-60 Scalder
50 to 200 birds an hour	Econo System I
200 to 500 birds an hour	Econo System I Modified

To take advantage of more automatic equipment you may decide to slaughter only at certain times during the week and process enough then to sell from stock the rest of the time. Often a small plant will find that in order to make the best use of labor they should slaughter in the morning, chill the birds, and eviscerate in the afternoon. It is very important to buy equipment that can be operated as efficiently and economically at times when sales are down as it is at maximum capacity. The more you rely on people along with semiautomatic equipment to achieve this, the better you are prepared—for you can stop hiring people or lay them off, but you can't stop paying for expensive fully automatic equipment until your business improves.

If you think that once you have started, business will improve quickly, now is the time to consider future expansion. If you can reasonably expect to increase your production into another range within the next couple of years then buying larger equipment initially, where possible, might save you a considerable amount of money when you are ready to grow.

B. Choice of Scalding Temperature

The appearance of the dressed bird when sold is largely determined by the temperature of the water in which it is scalded before being picked. The length of time it may be kept in ice storage and the number of birds an hour that may be processed with specific equipment are also very dependent on the scald temperature. There are three general categories of scald, differentiated by temperature:

1. "Semi" Scald - 124° - 130° F, 45 seconds plus

Under normal ice storage conditions, birds scalded at this temperature will usually last from 7 to 10 days without beginning to discolor, and they retain their yellow outer skin. However, a semi scalded bird is difficult to pick with any type of picker and must be scalded for a longer period of time due to the lower temperature. The longer time required for both scalding and picking will limit the volume of birds your equipment will be able to process in an hour. Another disadvantage is that the picker will not be able to do as thorough a job, and you will need more people to remove the pin feathers by hand. With semi scald, birds must be scalded as soon as possible after they have been killed.

2. "Slack" Scald - 140° - 145° F, 15 - 30 seconds

This scald does not require as long a time either in the scalder or the picker, so your equipment will perform more quickly and will also do a more thorough job. However, most of the yellow skin will be removed which may or may not make the bird more difficult to sell in your particular market. In addition, the appearance and keeping quality of the bird will normally last only 4 to 5 days under refrigeration.

3. "Hard" Scald - 160° F plus, 10 seconds

Practically no hand picking is necessary. Birds processed this way are white and may start to discolor in as little as 3 days. They should be allowed to bleed thoroughly before scalding. However, discoloring of the bird may be slowed down by processing under very clean conditions. Another answer would be to freeze the birds, but freezing equipment is expensive, and frozen birds are not readily accepted in some markets.

The type of scald you choose to use is very important in the selection of your processing equipment, particularly if it is automatic rather than manual. For example, the popular Pickwick TP-2 SPIN-PICK may dress as many as 500 2 • - 3 lb. broilers per hour under ideal "hard" scald conditions, yet may only be able to reach a maximum of 100-300 broilers an hour under "semi" scald conditions. Informing us of your opinion on the type of scald you wish to use will permit us to furnish more exact recommendations.

C. Availability of Labor

The more people you have available to train and keep at inexpensive wages the more you should rely on them instead of expensive fully automated equipment. Pickwick equipment has been designed to allow you the best possible blend of manual labor and equipment at each volume range.

D. Building

If you are planning a new building we recommend you contact your local Poultry Inspection Office, whether state or federal. If you are going to operate across state lines, you must operate under USDA-FSIS inspection. The USDA Circuit Supervisor, in your circuit, will issue your grant of inspection. This individual should be contacted in the early stages of your planning process. That individual will be of considerable help in design and will give you guidelines to prepare your HACCP Plan. A HACCP Plan is requirement for all food processing establishments. Sample floor plans for the Econo Systems can be found at the end of this material. If you plan to sell birds in the same state that they are processed, your state may have an inspection program. Contact your State Department of Agriculture division of Meat & Poultry Inspection for information. Also, there is the USDA. Exemption for farmers selling direct: Contact the USDA office or check on their web site for details: www.fsisusda.gov.

There are a number of points to keep in mind when planning a new building. Most important is that enough room is allowed, not only for work but for possible expansion; this latter point is especially important for the storage and freezer areas and the eviscerating room, for these areas must be increased in direct relation to volume. The Killing, Bleeding, Scalding & Picking System must be in a separate room from the Eviscerating operation. The Spin-Pick is designed to enable you to position the machine so the picked birds are ejected onto a receiving table. The receiving table can be positioned to extend, through an opening in the wall, into the Eviscerating room. All rooms should be finished with easily washable wall material, such as fiberglass panels or glazed tile. Floors should be smooth concrete sloped to adequate floor drains. The traditional USDA guidelines are one floor drain for every 400 square foot of floor space. Floors should slope •” per foot to drains except in bleeding areas where •” floor slope is recommended.

Traditionally, The USDA required 180F. hot water for sterilizing equipment that has been contaminated during processing operations. When used for cleaning, 180F. hot water will bake protein onto a surface. 140F. Hot water should be used for general cleanup. In addition, you should allow for the installation of a large hot water storage tank. That will provide ample hot water for cleaning.

II. PROCESSING METHODS

A very general discussion of processing methods is included at this point to assist you in understanding the relationships between the various pieces of equipment for purposes of planning. If you are not familiar with poultry processing, we strongly urge that you visit several operations if at all possible.

A. Slaughtering

The method of slaughtering any fowl is very important to the success of your operation, as is the speed with which the bird is handled from killing through picking. This is especially true when the birds are to be semi scalded.

An SKVS Electric Stunning Knife, which stuns the bird momentarily while it bleeds, is recommended for large birds such as turkeys and for all semi scalded birds. It facilitates faster bleeding of the bird and limits the splattering of blood around the room. When operating under USDA inspection, humane slaughtering regulations require stunning before bleeding. An alternative to the electric stunning knife is cutting into the brain, which also helps to relax the bird and prevent the feathers from becoming stiff. The artery in the neck is then severed, using a sharp knife with a narrow blade. It is not recommend severing the spinal cord during bleeding.

It is important that the birds be permitted to bleed completely, particularly if they have been hard scalded, but they must hang no longer than absolutely necessary. When they hang too long, even in hot weather, the feathers will be harder to remove and more hand pinning will be necessary.
The Pickwick System uses a 5 bird SH-5 Shackle. Birds are suspended by putting the feet in the shackle. The shackle is suspended on the end of the KTCS Bleeding Tunnel. Were the birds are stunned and the artery severed, the shackle moves, by gravity, along the pipe in the bleeding tunnel to the opposite end of the bleeding tunnel. This pipe also contains spray holes and a water connection. Water spray removes blood from inside the bleeding tunnel.

The operator removes the SH-5 Shackle, containing 5 bled out birds, from the KTCS Bleeding Tunnel and inserts the shackle into the shackle holder on the AD Dunkmaster. The Dunkmaster sits atop the AS60 Scalder. The start button on the Dunkmaster is pushed to activate the cycle. The Dunkmaster dunks and withdraws the shackle into water heated by the scalder. Usually a 20-second cycle is required for dunking the birds four to five times. The operator removes the shackle and the birds from the Dunkmaster, unloading the scalded birds onto the loading table of the Spin-Pik. The operator pushes the time button on the Spin-Pik and pushes the birds into the drum of the Spin-Pik. The timer and controls make the water and cycle in about 20 to30 seconds. At the completion of the time set, the water is turned off, the automatic door is opened, and the birds are ejected onto the receiving table of the Spin-Pik.

B. Scalding

Many tests over the years have proven that water with a low mineral content (0^{o} hardness) permits a shorter scalding period and results in substantially less need for pinning by hand. Although there are several compounds that may be added to hard water to improve it (including common detergents), the best investment for a larger operation might be a water treatment process—a water softener—to filter out the mineral deposits.

The cleanliness of the bird will greatly affect the length of time it may be kept in iced water before it begins to discolor. The use of the shackle and killing tunnel or cabinet are important in this respect since they permit the bird to bleed freely without contaminating others. However, much more important is the use of an automatic water level control on the scalder. This control

permits a steady flow of clean water into the scalder, washing out contaminated water and feathers. All Pickwick scalders have this feature.

The method of scalding itself is important, for the scald will not be effective unless it penetrates the feathers and reaches the skin; the lower the scald temperature, the more important this becomes. There are several methods of scalding that have been tried over the years.
The original technique was to grasp the bird by the legs and to lower it into the water and lift it out again, repeating for as long as necessary. This is a very efficient method, for as the bird rises from the water, the wet feathers hang down; when it is lowered back down, the water flows around and over these feathers and penetrates to the skin very rapidly. The time required for scalding is reduced, and the picking is made easier and faster. The disadvantage to this method is very obvious. One man could scald only 2 or 3 birds at a time, and he would tire quickly from constantly lifting the wet birds.

The next method was to pile several birds together in a basket or on a rotating shelf which automatically rotated them in and out of the water. This method, although still used, was an improvement only because it was mechanical. Because the birds are piled together, they press against each other as they go into the water and the feathers are prevented from opening up. The scald water takes a longer time to penetrate through the feathers, and picking is slower with more chances that the birds will suffer torn or bruised skin and broken bones. In addition, they must be loaded and unloaded by hand which slows production. If the scalded birds are not removed quickly, they will start to cook in the scalding basket.

Pickwick's solution to this problem is the AD Dunkmaster. The Dunkmaster sits atop the AS-60 Scalder. The Dunkmaster dunks up to 5 birds at a time into the AS60 Scalder. The Dunkmaster simply replaces a man in the original method of scalding. It holds up to 5 birds at a time by their legs, lowering them into the water and lifting them back out as many times as you require, all automatically. The birds are spaced so that their feathers may spread apart and permit the scald water to penetrate quickly. When the cycle is complete, they are raised completely out of the water so that the shackle and birds may be carried to the picker. While the Dunkmaster is working, the operator unloads the previous batch into the picker. No other method of scalding is as effective.

C. Defeathering

For the small or medium sized processor, there are two possible mechanized methods of removing feathers. The first is to hand hold each bird against a revolving drum which has a number of rubber "fingers" protruding from it. As these fingers rub against the bird, they rub the feathers off much as a man's fingers do when a bird is picked by hand. The bird is rolled across the drum so that all parts are exposed to the fingers long enough to remove the feathers but not to damage the skin.

This method, using a "manual drum picker," is recommended for the processor who desires to defeather up to 200-300 birds an hour. It uses equipment that is less expensive than other methods, and a good operator can defeather a bird in 10 - 12 seconds if the bird has been effectively slack or hard scalded. Capacity may be increased by simply adding another machine and operator to the line.

When capacity exceeds 300 birds an hour or so, it is more economical to use an automatic machine which will defeather several birds at a time. All of the various types of these machines have a tub into which the birds are placed. Either the machine will have a rotating disc at the bottom or a drum in the center that will rotate the birds in the tub, while rubber fingers in the walls of the tub and in the rotating disc or drum rub the feathers off. (See Pickwick Catalog -"SPIN-PICK")

These machines vary in capacity according to the inside diameter of their tub; the larger the tub, the more room there is for the birds to roll freely. The most important difference between the different types is the design of the tub and the disc, for it is this design which regulates both the force with which the birds are pushed against the fingers, and the degree to which the birds are permitted to roll freely. If they are forced too hard against the walls of the tub, they are likely to be bruised or have bones broken or dislocated, which spoils their sale value. If they do not roll freely, but frequently get caught, not only are they very likely to be damaged but the picking operation will take longer.

The present Pickwick SPIN-PICK automatic defeathering machine is the product of many years of research to find exactly the right design that would pick the birds quickly and completely, yet keep breakage to a minimum. The rotating disc is flat and relies only upon centrifugal force to move the birds gently yet firmly against the fingers, and a number of deflectors are built into the tub wall of the smaller models to insure that they tumble freely and evenly. Some competitive machines use a cone-shaped disc which tends to wedge the birds between the rotating cone and the tub wall, resulting in a more violent action with a higher proportion of damaged birds.

In addition, the SPIN-PICK includes (at no extra cost) several features that speed up your operation, but are available only as options in other types. An automatic timer activated by closing the door on the side of the SPIN-PICK starts the timed cycle causing a stream of water to spray down on the fingers and lubricate them, and washes the feathers down and out of the machine. When the birds have been defeathered, this timer automatically shuts off the water and opens the door so the birds are ejected onto a receiving table. The operator, once the machine has been loaded and the cycle started, is free to remove what few feathers remain on the slack or hard scalded birds and ready them for the next operation.

Another important feature is that the SPIN-PICK's disc continues to rotate between cycles, instead of stopping as does that of some other machines. Effective picking starts at once when the birds enter the machine, and the time in which they are exposed to possible damage is minimized.

Finally, the component parts of the SPIN-PICK have been carefully selected to guarantee long life. Stainless steel is used for the loading chute, tub, and table on the SPJ-3 and TP-2. The timer and other controls, the gear reducer in the larger models, and the fingers have all been selected expressly for these machines. At this writing, American processors are using SPIN-PICK machines which have operated continuously for 20 years or more without major repair.

D. Pinning

The birds should have any remaining pin feathers removed by hand immediately after picking and before they are chilled. The operator of the SPIN-PICK may do this job by himself if the

birds have been slack or hard scalded. However, if they have been semi scalded, one or more additional people will be needed to help.

You may wish to "singe" or burn the smallest feathers off rather than pick them by hand. This is accomplished with a hand-held gas singeing torch.

E. Chilling

Slack scalded birds should be dropped into slush ice immediately after defeathering until their body temperature drops to 38 deg. F. or less. Many operators who previously thought a semi scald was required are changing to the slack scald, for they have found that the slush ice chill after picking results in an excellently finished product, particularly when the birds are to be frozen. Air chilling is becoming more popular. The birds are hung on to a CR150 Chill Rack, the rack is portable, stainless steel contraction and will hold up to 150 birds. The flesh on a cooler air chilled bird is firmer then flesh of a water chilled birds. Air chilled birds are often received by the consumer as a higher quality product and sometimes sell for a high price per pound... Chilling is not always necessary if the birds are to be eviscerated immediately.

F. Evisceration

In many areas it is possible to find birds that have not been thoroughly cleaned inside, or "eviscerated," because this is an expensive and time-consuming function for the processor to perform. However, the large majority of processors do eviscerate all of their birds if only because competition has forced them into it, and it is required if the bird is to be deep frozen. In any case, (usually) the bird that has been eviscerated will bring a higher price.

Evisceration is largely a manual process, for although automatic equipment will be available in the near future, it is too complicated and expensive for any but the largest processors. It will also require birds that are nearly identical in size and shape.

In the past, evisceration was performed on tables and the bird was passed along from one operator to another until it was finished. Most plants now have an overhead conveyor to carry the birds, and a metal conveyor under the trough for the waste products. Accessory equipment would include water lines for a steady supply of fresh water, various spray valves for washing the bird inside and out, manual or vacuum-operated lung removers, and accessory tables.

The number of people required for eviscerating will vary considerably from one operation to another. The following are estimates of the personnel necessary for several different capacities.

Type of Birds: Broilers Volume / Hour.
500 - 1000 SLAUGHTERING:

1. Hang 1
2. Kill 1
3. Scald 1
4. Pick 1
5. Pinning (Not required 0 with Hard Scald)

6. Rehang 0

EVISCERATING:

7. Remove Oil Bag 1/2
8. Cut Off Feet /2
9. Remove Head 1/2
10. Slit Necks 1/2
11. Remove Crop 1
12. Open Abdomen 1/2
13. Pull Viscera 1
14. Drop Viscera 0
15. Remove Heart , Liver 1
16. Cut Gizzard 1
17. Peel Gizzard (by 1 hand)

18. Wrap Giblets 1/2
19. Remove Lungs 1
20. Wash Inside 1
21. Remove Neck 1/2
22. Stuff Giblets 1/2
23. Take Off Birds 1/2
24. Ice Tank Attendant 1/2
25. Final Inspector 0

TOTAL PEOPLE: 12