A pig slaughterhouse with larger throughput mostly uses the line-slaughter system. "Line slaughter" includes hoisting the carcass on the rails at bleeding and subsequent slaughtering and dressing procedures are carried out with the carcass suspended on and moving along the overhead rail (or line). This method is in contrast to the booth slaughter system common in the past and low throughput slaughter houses. In the booth system, slaughter spaces are divided into many spots ("booths"), which allow for the simultaneous slaughtering of a certain number of animals ("batch"). A team of men attends each slaughtering spot.

The animals in a batch are each taken to a defined floor area, slaughtered and dressed in that spot. The simultaneous slaughtering often creates congested conditions and hygienic problems. The equipment is typically limited, in some places only a knife and axe are used while others have hoists for lifting the carcasses. Cradles are used to keep the carcasses from floor contact. Medium-sized municipal or private abattoirs were designed for batch slaughter because it is cheap to construct compared with a line-slaughter facility.

In very small slaughter operations where the line system is not warranted, the principle of booth slaughter is acceptable and widely applied. In small-scale conditions, the slaughtering and dressing of animals on the same spot can be done hygienically if the necessary equipment, such as hoists, cradles and scalding facility, are used together with an overhead railing to facilitate the dispatching of the carcasses.

Slaughter systems for pigs

As the pig skin is commonly eaten and so it requires the removal of the hair during slaughtering, which is done by scalding the pigs in hot water (60°–62°C) or by steaming the skin in more advanced operations. Both procedures serve to loosen the hair, which is then removed by a scraping process. In small- to medium-sized operations, a knife is used for scraping, but in larger operations machines are used.

Once the hair is removed from a pig, there should be no further contact between the floor and the skin (which will become food for human consumption). Scalding can be done by either pouring hot water onto the carcass or submerging it in a container filled with hot water. For loading and unloading the carcasses a modified wire mesh carrier is to be designed and used. The carcass is then placed on a ladder-type device (cradle), in a horizontal position, for dehairing and then turned vertically up. In this position, eviscerating and carcass cutting can be hygienically carried out.
Basic equipment required for slaughter and dressing for pigs

Slaughtering requirement, particularly for small-scale operations, need not be elaborate and expensive. The amount of equipment will depend on the slaughtering procedures employed. If possible, all equipment should be made of stainless steel or plastic, be rust-resistant and easily cleaned and sanitized. Equipment that does not come in contact with the meat (eg. overhead rails, working platforms, stunning pens) is usually made of galvanized steel.

The basic equipment that is needed for the slaughtering operation consists of:

- Stunning gun, electrical head tongs or simple stunning equipment for direct blow;
- Knives: - sticking: 16 cm sharpened on both sides;
  - skinning: 16 cm curved
- a sharpening steel;
- oil or water sharpening stone;
- scabbard and belt for holding knives;
- meat saw (hand or electric) and cleaver;
- block and shackle or chain hoist strong enough to hold the weight of the animal to be slaughtered;
- a strong beam, tripod or track 2.4 – 3.4 m from the floor;
- spreader- gambrel or metal pipe;
- several buckets;
- working platforms.

The following items are additional equipment required when pigs are scalded and scraped rather than skinned:

- Scalding barrel or tank;
- Pot, barrel or system for boiling water;
- Bell scrapers;
- Solid scraping table or platform;
- Thermometer registering upto 70°C
- Hog or hay hook;
- Torch or flame for singeing
- Other useful additional equipment includes:
  - Stunning pen;
  - Bleeding hooks (for vertical bleeding);
  - Blood-catching trough;
  - Wash trough (for tripe).

The following items are necessary for sanitation of hands and tools:

- Hand wash-basin;
- Implement sterilizers
Commercial pig-slaughter operations usually have a minimum daily throughput of 50 animals in a small facility and up to 400 or more in a larger place. At present situation our country requires small-scale pig slaughter for commercial purposes because of less capital investment and small farm holdings whereas in medium-sized and larger pig-slaughter operations, which is expensive, hygienic slaughtering can easily be achieved by equipping the facility with a modern set-up: railing systems with elevating devices, electrically heated scalding vats, lifting devices for moving carcasses into and out of the vat, dehairing machines with mechanical loading and unloading devices and electrical splitting saws.

A great deal of improvement can be achieved if the pig slaughtering and dressing are carried out on floor surfaces constructed at different levels (a "terraced" or multi-tiered system). In this approach, the killing of the pigs takes place at the highest level and carcasses are gradually lowered during the various procedures. This system utilizes gravity and facilitates moving the carcasses without complicated electro-mechanical elevating equipment.

In a small-scale facility, two different tiers, or levels, of the floor may be sufficient. However, evisceration must be done with the carcass in a horizontal position after completing the manual dehairing, although horizontal evisceration is not the best hygienic solution. Also, if carcass splitting is carried out (which is not the case everywhere), it may be necessary to do so in a horizontal position on the table.

Much better working and hygienic conditions can be achieved with three tiers, or levels, of floor surface. The bleeding of the pigs after stunning and the collection of the blood have to be done carefully for hygienic reasons. Blood is usually collected in a receptacle that is held close to the bleeding wound. Care should also be taken that the scalding water is renewed or supplemented with fresh water from time to time and maintained at the correct temperature (60°–62°C).

In the two- and three-tiered systems, the overhead railing starts at the scraping and gambrelling area. From here, all procedures are organized in a straightforward and hygienic manner. Above the scraping table, the rail can be kept low for easier gambrel lifting of the carcass (with the hind legs of the pig hooked). The eviscerating and splitting procedures take place on another lower level of floor, which enables the operators to work more easily because the rail height at their level is approximately 2.6 m high. In this method, there is no risk of the carcass touching the floor. The great advantage of the terraced (multi-tiered) floor is the lack of need for electro-mechanical lifting or moving devices. An overhead railing system that starts at the gambrelling operation (at the scraping table) is sufficient and can be manually operated.

The system is essentially semi-line slaughter because, starting from the gambrelling operation, all processes take place on the rail. Investment costs are low because only a few pieces of technical equipment are needed (beyond the physical building): electrical stunning tongs, a scalding vat (preferably electrically heated with thermostat for maintaining a constant temperature), a scraping table and overhead rails with gambrels.
Required equipment for a terraced pig-slaughter line (one line with 20 head/h):

1. Electrical tongs
2. Scalding vat (stainless steel, locally made)
3. Scraping and gambrelling table (stainless steel, locally made)
4. Railing system (galvanized, locally made)
5. Hooks/gambrels (stainless/galvanized, locally made)

In contrast to the traditional lines, modern pig-slaughter lines consist of the following technical devices for smooth production and adequate hygiene:

- Electrical stunning equipment
- Bleeding hoist and trough
- Scalding vat with loading and ejection device
- Dehauling (scraping machine) with ejection device
- Scraping and gambrelling table
- Gambrelling hoist
- Platforms and overhead rails for eviscerating and dressing.

Electric breastbone and splitting saws are commonly used to replace the knife and axe. More sophisticated lines also use vacuum bleeding with a hollow knife, carcass singeing and polishing machines, and automated conveyor systems.

Modern pig-slaughtering line with basic equipment (from 12/h):

The line length is 20 m. Bottlenecks, or production jams, which determine the throughput per hour, tend to occur at the scalding vat stage. Minimum scalding time for one pig should be four minutes. If the scalding is done one by one, 12 pigs can be put through per hour — on the assumption of five minutes for one pig (scalding plus transfer time).

To increase the frequency, machines that enable simultaneous scalding of several pigs have been developed. Nowadays, these are widely used in medium- to larger-sized pig-slaughter facilities. Also, larger operations have replaced the relatively slow manual or electrical hoists used in the bleeding and at gambrelling operations with continuous electrical elevators. These are very practical because bleeding hooks and gambrels can be easily hooked on to lift up the carcasses.

The gambrelling from the scraping table enables the suspending of the carcasses in a spread position, which in a medium-sized operation allows for the final hair removal (by knife), singeing (manually by torch), eviscerating and splitting. However, the spread position also can be achieved with ordinary dressing hooks in

Pork we eat
two ways: either by inserting a metal bar ("spreader") between the hooks or by installing a double rail, with one hook attached to each rail.

**Required equipment for a low-capacity modern pig-slaughter line**

1. Electric stunning equipment
2. Electric hoist (for bleeding and loading vat)
3. Scalding vat 1.5x2.5 m (electrical heating and discharger)
4. Dehairing machine
5. Scraping/gambrelling table (stainless steel)
6. Gambrelling hoist
7. Railing system (galvanized)
8. Hooks, gambrels (galvanized/stainless steel)
9. Platforms (galvanized)
10. Electric splitting saw
11. Breastbone saw
12. Miscellaneous equipment

![Diagram of pig slaughtering with set of technical equipment]

**Equipment required for further processing of pork**

1. Band saw for fabrication carcass and cutting to desired retail cuts
2. Weighing balance
3. Packaging and sealing machine
4. Brine injector, curing facilities, curing cellars, smoking cabinets/chambers, cooking vat, vacuum tumblers, salinometer, thermometer and slicers are needed for processing cured and smoked pork products like bacon and ham
5. Meat mincer, bowl chopper, sausage stuffer, cooking vat, forming machine and cold storage facilities are required for processing emulsion based pork products.

**Conclusion**

The equipment to be installed must be considered based on the system of slaughter to be adopted for effective utilization with minimal investment. The material used for equipment design must facilitate in the wholesome production and pork and further processing of pork products.