BROAD GUIDELINES FOR CAPACITY ASSESSMENT OF MEAT PLANT

1. *Lairage and Holding*

For an integrated meat plant it is essential to have sufficient lairage space for resting animals for 12- 24 hours prior to slaughter. As per BIS standards an area of 2.5 sq. mtr. per livestock is required for movement of the animal. Ideally the lairage should be covered and there should be sufficient arrangement for water to the animal. There should be an ante-mortem area for inspection of the animals and isolation pens for keeping rejected animals.

The total lairage area in sq. meter should be calculated and this should be divided by 2.5 sq. meter to arrive at the total number of buffalo livestock that can be kept in the lairage at one time. There may be a sufficient area of holding before sending the animal to the lairage.

2. *Slaughter Line*

For the slaughter line the time has to be calculated physically from the halal activity to the time buffalo is hung after slaughter. Sufficient bleeding time is essential and a minimum of 8 minutes bleeding time is recommended to ensure a proper drainage of blood which has a direct impact on the Quality of the Meat. Therefore, the time taken from the Halal box to the rail per animal has to be calculated and also calculate the bleeding time to see how many carcasses can be kept on the bleeding rail before starting other processes.

An abattoir line operates for a maximum of 16 hours in a day with 8 hours of operation followed by 2 hours of cleaning and again followed by 8 hours of operation and 2 hours of cleaning and the balance 4 hours for repairs and maintenance.

3. *Chillers*

Since India is not free from FMD it is essential that carcasses are chilled for 24 hours to achieve pH below 6. It should be mandatory for the carcass to be chilled for a minimum period of 24 hours before the deboning operation commences.

The chilling capacity is calculated on the basis of total meters of conveyor rails in each chiller room. In one meter of the conveyor rail 3 halves or Quarter's can be stored. This means for one meter of rail 1.5 carcasses can be hanged for chilling if the chilling is done in Halves or 0.75 carcass can be hanged if the chilling is done for quarter (4 pcs.)

The internal length and the breadth of the chiller has to be taken and then the total length of the conveyor rails has to be calculated, which should be

multiplied by 1.5 carcass/ mtr in case of halves OR by 0.75 in case of Quarters being stored.

In the Indian context, the average carcass weights, it would be safe to assume 225 kgs. as the bone –in average weight per carcass.

4) Deboning and Packing Halls

For the deboning and fresh packing hall assessment has to be made on basis of the number of tables kept in the room. Typically each table can accommodate 4 workmen and on an average on butcher can debone maximum of 6 animals per day and one packing person can handle a maximum of 800 kgs. per day. This shall have to be physically assessed at the time of inspection of the plant. Basis for the number of tables in the rooms and the numbers of butchers and packing person's assessment has to be made for the capacity that can be packed in the plant.

5) Freezing

(a) **Plate Freezers :** In India typically plate freezers are used with either 90 trays or 120 trays or 150 trays or 180 trays. Each meat tray weighs an average of 10 kgs. Typically a plate freezer takes a freezing time of 2.5 hours per cycle and considering the loading/ unloading time each plate freezer can have 8 working cycles in a 24 hours shift. Therefore, each plate freezer of 90 trays can give 90X10=900 kgs X8 cycles=7.2 tons per plate freezer. Similarly, 120X10=1.2X8=9.6 or say 10 tons or 150 tray per kg. plate freezer will give 150X10= 1.5 ton X 8 = 12 tons per plate freezer. A 180 tray plate freezer will give 180 X 10 = 1.8 tons X 8 cycles will give 14.4 tons or say 15 tons per plate freezer per day.

(b) Blast Freezer: Typically, in a blast / tunnel freezer one load can be obtained in 12 -14 hours and considering the loading / unloading time only one load per blast freezer per day can be usually obtained. However, in the case of some modern plants which have PLC based screw conveyors it is possible to get 2 blast freezer loads in 24 hours.

Typically trolleys that are being used for the blast freezers can accommodate 20 trays and each blast freezer tray can accommodate about 20 kgs. of product. In some cases upto 25 kgs of product can also be accommodated in the blast freezer tray and therefore each trolley can freeze about 20 trays X 20 kgs = 400 kgs or 20 X 25 = about 500 kgs. Therefore it would be safe to assume that each trolley can accommodate 450 kgs. per blast per day.

Generally, the trolley size is universal in the Industry however, at the time of inspection it is be physically assessed regarding the number of trolleys that can be placed in each blast freezer and then it is multiplied by the number of blast freezers available in the plant.

The total freezing capacity would be a total of the plate freezing as well as the blast freezing capacity of the unit.

6) Cold Storage

While it is important to note down the capacity of the cold storage it does not have any direct bearing on the freezing capacity of the plant. Typically the capacity of the cold store can be arrived at by taking the actual floor area in sq. meters and multiply the same by 0.75 MTS per sq. meter provided the product is stacked up to a height of around 2.7 meters. If the cold storage is in the mezzanine floor also then the capacity would increase proportionately.

7) Rendering Plant

Although rendering plant once again do not have any bearing of the capacity of the unit it would be better if it can be ensured that rendering plant of sufficient capacity has been installed to take care of the offal's and the bones that would be available for rendering. Typically, each animal would give 140 kgs. of products that would be available for rendering on an average after considering offal's that are packed for exports.

Estimated calculations:

- Average weight of live animal – 400-500 kg.
  Ref. Dr. S.K Ranjhan
  Book: Animal Nutrition

- Average Bone in weight realization -45-50%
  Ref. Research paper Dr. Kondiah, IVRI

- Average Bone less meat from Bone In -65%
  If we take this 450X47 =212 = Bone In
  65% of 212 = 138 Bone less

- Generally saleable offals- 10-12 kg. = 138+12=
  Yield - Say 150 kgs. per animal

Out of all the parameters, which ever area can handle the least number of animals/ tons should be assumed as the capacity of the unit.