

## PRE-SLAUGHTER CARE AND MANAGEMENT OF SLAUGHTER ANIMALS

*Dr. Anish Antony  
Senior Research Fellow, Centre of Excellence  
in Meat Science & Technology  
Mannuthy, Thrissur*

Meat is regarded as a delicacy by most of the people throughout the world often transcending cultural and national barriers. Even though meat has been produced and consumed since prehistoric times, the methods of slaughter and meat production have undergone a sea change in recent times particularly, in the 20th century. The values of humaneness and empathy, which is often considered the hallmarks of the modern civilized world, demanded similar treatment being meted out to all living beings especially animals. Moreover, the emergence of meat science as a scientific discipline envisioned that the production of carcasses and meat of high hygienic standards and quality requires sound husbandry methods and preslaughter handling. In this context it is imperative to keep healthy and clean animals and to handle them humanely from farm to slaughter hall.

### THE EFFECTS OF TRANSPORTATION AND PRE-SLAUGHTER HANDLING ON CARCASS AND MEAT QUALITY

Various conditions are induced in slaughter animals during their transport and pre-slaughter handling which deleteriously affect the carcass and meat quality. Therefore the care of animals from the time they leave the farm to the time of slaughter is very important. During ante mortem period their condition may change appreciably. The conditions induced in slaughter animals which affect the carcass quality are physical injuries such as bruises, trauma, lacerations and fracture, shrinkage or loss of weight, diseases and even suffocation and death.

#### 1. Physical Injuries- Bruises, Lacerations, Fracture etc.

Bruises develop as a result of almost a dozen factors, viz, lack of bedding, inhumane or rough handling, defects in the vehicle design and construction, transport, stunning box design, mixing of horned and polled animals, over and under loading of vehicles, long delay in transit, temperament of the animals, fighting etc. Handling of livestock at all stages between the farm and the abattoir is considered the single most important factor in the bruising problem. Rough handling and the abusive use of clubs whips, electric goads, etc are responsible for the majority of the injuries causing just over 50% of all the damage to carcass. Slippery surfaces and haphazard loading and unloading operations are the prime causes of fracture.

#### 2. Transport Mortality

Deaths in all classes of livestock occur during transport. Sheep and pigs are frequently found dead as a result of

suffocation during transport. In pigs the rate is more during the warm summer months. Feeding of pigs immediately before loading on the vehicles and fighting among pigs from different social groups are also found to increase the mortality rate. Ambient temperature is an important factor determining the incidence of death.

#### 3. Shrinkage

Shrinkage is the loss of weight caused by fasting and faulty transport

Considerable loss of weight during transport will occur due to faulty methods of transport, change of weather (temperature and humidity), fasting, stress, etc. The loss can also consist of loss of gut contents through defecation. Moisture loss is by sweating, respiration and through urine. It is difficult to assess the actual loss of flesh during transport. Shrinkage is probably due to loss in muscular and fatty tissue with an abnormal loss of moisture from the muscular tissue. The effect of overexertion, excitement and strange surroundings on pigs during transit may cause a loss of 6-7% in the weight of liver.

#### 4. Diseases And Other Affections Induced By Transport

Slaughter animals in poor condition that have become fatigued by a long journey without sufficient food and water succumb to diseases. Transit (Shipping) fever, transit tetany and salmonellosis are the major conditions encountered. Miscellaneous conditions include heat stroke, indigestion, abortion, post parturient disorders, ketosis, enterotoxaemia, mastitis, foot diseases, gastric ulceration in pigs etc.

#### 5. Effects On Meat Quality - PSE and DFD

During the process of loading, unloading, detention in lairage and subsequent handling up to the point of slaughter, the animal is subjected to many stressors, which may have adverse effects with subsequent deleterious changes in the carcass. In addition to physical trauma, other stresses in the form of sound, light, humidity, cold, wind and fear cause abnormal bodily changes at slaughter. There are two main reactions of the animals exposed to stresses.

1. Alarm or emergency reaction, which is a result of sudden adverse stimuli and takes place immediately.
2. General adaptation syndrome, which is the essential stress reaction and is longer lasting.

These reactions set up complex homeostatic adjustments in the body involving hormones like corticosteroids and

catecholamines. A major sequel of this is a conversion of glycogen to glucose especially in the liver and muscles. This reduction in glycogen level adversely affects the postmortem acidification of muscles. Two common conditions that occur as a result are Dark Firm Dry (DFD) in cattle and Pale Soft Exudative (PSE) in pork. Dark Firm and Dry meat results when animals are subjected to prolonged stress, viz., transport on hoof resulting in depletion of glycogen reserves in the muscle. The glycogen level is very important because the post mortem glycolysis in the carcass produces lactic acid, which causes a reduction in pH to 5.5-5.8, resulting in the transformation of tough muscle to tender meat. In the absence of glycogen, the pH fall is very small i.e., from 7 to about 6.8 only, instead of the required 5.6, resulting in DFD meat with poor keeping quality. PSE is caused by a rapid fall in muscle pH. Normally it takes about 4-8 hours for a pH fall from 7.0 to 5.5. But in case of PSE pork the final pH is attained within an hour. If the temperature of the carcass remains high, changes occur in the properties of the muscle proteins and the flesh becomes watery, assumes a pale unattractive colour and lacks flavour. Many stress factors have been associated with this condition like high environmental temperature, rough ante mortem handling, fighting and inefficient slaughter techniques etc.

#### MEASURES TO PREVENT LOSSES IN CARCASS AND MEAT QUALITY SLAUGHTER ANIMAL MANAGEMENT IN THE FARM

In developed countries like United States and United Kingdom there are separate codes of recommendations for the welfare of livestock available for cattle, sheep, pigs, deer, poultry, turkeys and ducks. All these codes are based broadly on the five basic animal needs.

1. Freedom from thirst, hunger and malnutrition.
2. Appropriate comfort and shelter
3. The prevention or rapid diagnosis and treatment of injury, disease or infestation.
4. Freedom from fear and distress
5. Freedom to display most normal patterns of behaviour.

#### Healthy Animals

An ethos of good husbandry and stockmanship on the farm produces healthy animals consistently for slaughter. This is particularly so where animals are cared for under intensive systems of agriculture, where attention to nutritional balance and preventive medicine programmes entailing the use of vaccines, anthelmintics and feed additives are of particular importance. Therapeutic application should be performed with proper care. Careless and unhygienic use of hypodermic syringe is responsible for much unnecessary pain in animals and for considerable damage to carcasses and consequent partial condemnation due to the production of abscesses and in some cases necrosis at the site of injection. Abscesses and tubercles

reduce the value of hide in cattle, sheep and goat. Also the injection site must not be an area, which is not associated with more expensive cuts. In this context it is imperative that piglets are not injected with iron into the ham and that the hind leg is avoided when injecting lambs with antibiotic.

#### Residue Free Animals

Adequate withdrawal periods should be provided for the animals after administration of all veterinary therapeutic drugs in order to prevent the problem of drug residues in meat, which may cause multiple drug resistance in consumers. It should be also borne in mind that in any case hormonal growth promoters should not be given to slaughter stock.

#### Transport of Animals

Having produced healthy livestock in good conditions, it is necessary to keep them free from contamination during the subsequent movement to the point of slaughter. The transport must ideally satisfy the following.

1. Prevention of injury and spread of diseases.
2. Observance of necessary standard of hygiene
3. Avoidance of unnecessary suffering during transport

Most countries have detailed regulations for humane transport of animals. In Great Britain a series of orders dating back to 1919 had been promulgated, viz., *Transit of Animals orders 1927, as amended 1931; Animals sea transport order 1930, The transit of horses order 1951, The transit of animals (General order) 1973, (amended 1988; 1992) Transit of animals (road and rail order) 1975 (amended 1988; 1992)*. These orders outline the general provisions for road and rail vehicles and receptacles and deals with the separation of animals during transport and concerns cleansing and disinfections.

#### Transport On Foot

When slaughter animals are driven over short distance by road under favourable conditions, animals will show no signs of physical strain on arrival at the place of slaughter provided there is proper treatment enroute. All unnecessary crude practices to keep the animal on the move should be discouraged because of the production of adverse effect on the quality of meat. Movement of cattle on foot with adequate grazing, watering and rest is an excellent means of transport.

#### Loading and Unloading

Floors and ramps should be made anti-slippery. Ramps are required to have a gradient not steeper than 4 in 7 when the vehicle is on the level ground. Studies indicate that ramp angles of 20° appear to be ideal for the pigs whether ascending or descending. Any step at the top of the ramp must not be higher than 21 cm or a gap between it and the vehicle, wider than 6 cm. Pigs prefer to walk up than down. Loading and unloading must be carried out in such a way that animals are not inflicted with injury or unnecessary sufferings. Coercive instruments like

electric goads as well as beating of animals should be avoided.

### Road Transport Vehicle Design

Road transport should essentially meet the requirements in design and construction of transport vehicle, separation of animals during transportation and sanitation in the vehicle. Road trucks for the transportation of animals should be specially built for the purpose and adapted to the different classes of animals. The vehicles must be of durable construction and the fitting must not in any way cause injury to animals. Barriers or straps are necessary for use when the ramp is lowered for loading or off loading. Each internal ramp of the vehicle must have a gradient of not more than 2 in 3. Ventilation should be adequate. Provision of food hold aperture and lighting in the vehicle will enable the inspection of its occupants. The interior should be free from any sharp edges or projections, which are likely to cause injury or unnecessary suffering to the animal. Tying points must be supplied to secure the animals where necessary. On humane ground, animals conveyed by truck should not be fettered unless there is risk of their jumping out. Provision of partition is essential to prevent fighting. In road trucks partitions should be of length 3.7 m in the case of cattle, 3.1m in the case of sheep, goat and pig and 2.5 m in the case of calves. The vehicle should be provided with suitable rigid size and protective overhead covering. After each journey the vehicle must be cleaned and disinfected immediately.

### Specifications Regarding Different Classes Of Animals During Transport

Secured and unsecured animals may not be carried in the same undivided vehicle. Different classes of livestock such as horned and polled cattle, calves, ewes with unweaned lambs, rams over 6 months of age, weaned piglets, pigs from different pens, etc. are separately transported. Horned and polled cattle may be carried together provided, all are secured by head and neck. Unfit animals and those likely to give birth during the journey are not permitted to travel. In case of long journey, animals should be provided with water, feed and rest at least every 12 hours during the journey except where a journey is completed within 15 hours. European standards stipulate that the interval must not exceed 8 hours.

### Stocking Density During Travel

Overloading is stressful to animals especially pigs. In hot weather it may lead to suffocation and death. American regulations specified minimum floor space for animals as 335 cm<sup>2</sup> for pigs, 231 cm<sup>2</sup> for sheep and 271cm<sup>2</sup> for calves. Cattle placed crosswise in the wagon requires 56-66 cm of the car length. The number of animals that can be carried in a vehicle can be calculated as follows.

1. Average weight of the stock is determined.
2. The legal load limit of the vehicle to be used is then divided by average animal weight to get the overall

number of animals, which can be carried, legally on the vehicle.

3. Overall number of animals is then divided by the total length of loading space to find the number of animals per running foot of space.

### CARE AND MANAGEMENT OF THE ANIMALS IN LAIRAGE

#### Lairage Design and Housing

Lairage is the place where animals are unloaded and rested before slaughter. Calm and comfortable lairage accommodation is a major prerequisite in the production of good quality meat from slaughter animals. The lairages must be designed so as to ensure easy movement of animals to the point of slaughter. It is preferable to have solid sidewalls in the lairage to reduce injury and draughts. Provision of non-slip floor and two way gates, water troughs and avoidance of sharp corners will reduce stress. During this period animals must be kept under conditions, which prevent any further contaminations of feet, hides, and skins. Solid floors with no bedding, regular hosing and good drainage provide satisfactory condition for cattle and pigs. Pigs rest more contently if they can lie against a solid wall rather than rails. And there is less fighting if they are confined to long narrow pens rather than square ones. In case of pigs care should be taken to avoid mixing of animals from different pens as far as possible to reduce fighting. Dominant boars as well as females in estrous should be secluded. Fighting between pigs can cause widespread bruises on the body, which will get infected too soon owing to the contaminated surface in which the pigs reside. Either rails or walls are satisfactory for cattle and sheep. In case of cattle, horned animals should be separated and properly tethered to avoid injury.

#### Water Supply

*Ad libitum* supply of drinking water is necessary to regain tissue moisture during preslaughter rest. Ample drinking water also lower the bacterial load in the intestine and facilitate the removal of hide or pelt during dressing. Electrical stunning is more effective in the animals supplied with sufficient drinking water. Adequate hose points conveniently placed and providing sufficient volume and pressure of water are absolutely essential.

#### Fasting Of Slaughter Animals

It is ideal to fast the animals for 24 hrs before slaughter to prevent contamination of carcass from intestinal and stomach contents. Fasted animals bleed better and the carcasses are easier to dress and have a brighter appearance. But excessive preslaughter fasting should be avoided. Pre-slaughter fasting for about 70 hrs is found to have reduced carcass weight by 7%.

#### Glycogen Replenishment

Sugar solutions are given to animals in certain countries to ensure adequate pre-slaughter levels of glycogen. In a study it was

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