# Guidelines for Carcass Disposal

**Central Pollution Control Board**
**Delhi**
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## 1.0 INTRODUCTION

In India large number of cattle die of natural causes in villages and municipal areas every year. However, there is no organized and scientific system for the disposal of carcasses, in the absence of which, it has become a major environmental hazard. In most cases, whereas the hides are removed for leather, the remaining carcass is left to putrefy in open without any control resulting in highly repellent stench permeating into surrounding atmosphere. As no enclosure is provided, vultures and dogs are attracted to such sites polluting the environment and creating health hazards and can also cause air accidents

Further, it is mandatory under Prevention and Control of Infectious and Contagious Disease in Animal Act, 2009 to dispose-off the fallen animals/carcasses properly. This Guideline outlines available methods for carcass disposal, the related environmental issues, the required pollution control measures to be implemented and the way forward to address issues related to carcass disposal in the country.

## 2.0 Current practices of carcass disposal

### 2.1 Carcass utilization plant:

Utilization of dead animals has many benefits. According to one estimate among dead animals 30% of cattle, 20 % of buffaloes, 46% goats and 50% sheep on an average are not flayed and 9 million bovine hides and 9 million ovine and caprine skins are lost annually due to non-recovery in India . After flaying, carcasses of dead animals can be processed to produce valuable meat-meal, bonemeal and technical fat. These products have good demand as feed ingredients of poultry and dairy animals. The economic utilization of dead animals, is imperative to reduce the spread of diseases. It also reduces the feed grounds for vultures and saves aircraft from bird hits. However, factors such as social, economic and climatic conditions as well as lack of technical knowhow and efficient processing machinery have hampered efficient utilization of carcass utilization in the country.

Carcass Utilization involves integrated utilization of all tissues of fallen carcass for value added product which find application in animal feed/leather industry/fertilizer/chemical Industry . The process includes lifting of fallen animals, flaying, preservation of hides and skins, rendering (cooking) of the flayed carcass, preparation of meat meal, bone meal, tallow, besides treatment of effluent waste water and conversion of rumen contents into manure. Machinery/Equipment used in the process includes flaying tools, wet rendering cooker, meat mincer, bone crusher, drier and pulveriser, transportable flaying and lifting device

### 2.1.1. Production Process

Rendering involves removal of hides/skin at the flaying yard from the Carcass, separation of rumen contents and horns and hooves. The rest of the animal body consisting of flesh, tissues and bones is cooked in a cooker for obtaining tallow and cooked meat and bones. Limited amount of water is added in the cooker for the production of steam. The separation of cooked meat from bones is carried out manually. The separated bones are crushed in the bone crusher for obtaining bone meal. The separated cooked meal is generally sun dried. However, during rainy season this meat is first minced in the meat mincer and then dried in a rotary drier. The dried meat is pulverized in the pulverizer for producing meat meal. The meat meal can also be mixed with bone meal for making meat cum bone meal.

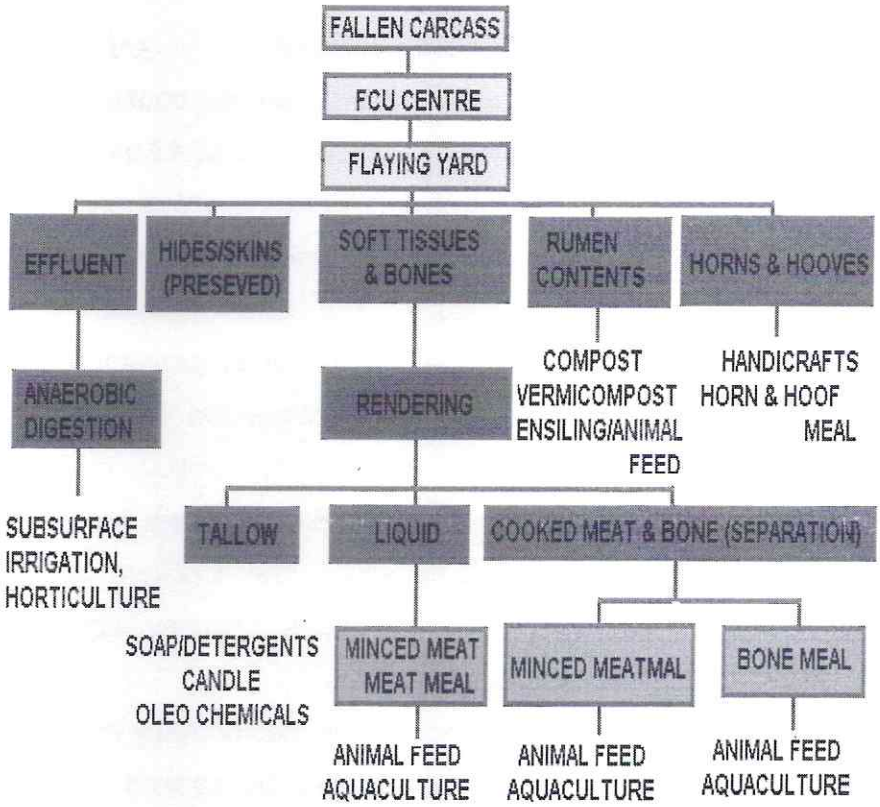
Rendering is essentially done in dry or wet process. In a wet rendering process, steam enters the rendering tank, along with the biomass. In dry process, steam is confined in a jacket that surrounds the tank containing the material being rendered The dry rendering process yields are 20 per cent higher than the wet rendering process as the water soluble extractive and proteins suspended are not discarded. In other words in dry rendering process, the meat and bones are cooked in its own fluid and

fried in its own fat. As the yield is in dry rendering is higher, it should be adopted wherever feasible

The slurry containing tallow is collected into an open pan from the rendering vessel. It is allowed to cool so that fat will solidify on the top layer. Fat is scooped off and collected in a separate vessel. There are impurities such as water with soluble proteins and some minerals. Hence the fat containing water and other impurities iscooked in an open pan by adding alum and salt. Water is evaporated and then purified tallow is collected.

The process flow chart is given in figure 1.0

**Figure 1.0 Carcass utilization plant**




**2.1.2 Carcass Utilization Products:** 3 main products are obtained from this technology:

a) **Tallow or fat** is obtained by `clarifying' fatty tissues and from the cooker, the former being white superior grade and the

latter slightly yellowish. These are familiar products and find a ready market in soap-manufacturing.

b) **Meat Meal** is a protein-, vitamin- and mineral-rich material used as a supplement in poultry feed. It is completely sterile and free from pathogens since it is processed at high temperatures. It is a valuable substitute for fish meal since it is much cheaper and also eliminates need for some other additives. Meat meal can also be used as Pig Feed.

c) **Bone Meal** is rich in phosphorous and calcium, is famous as fertilizer especially for horticulture, floriculture and home gardens. Bone meal is also an extremely beneficial supplement in poultry feed for both layers and broilers. It is also a powerful nutritional supplement in the growth phase of dogs.

### 2.1.3 Equipment & Machinery

**(i) Carcass cooker;** Carcass cooker is a pressure vessel to operated at a pressure of 35-40 psi. The Cooker handles one large carcass (250 Kg) at a time, larger capacity vessels not being preferred since the timing of carcass arrivals is unpredictable and each carcass should be processed immediately on arrival to prevent putrefaction.. At least 2 Cookers are recommended for each unit for reasons as above. Overhead rails, trolley, chain and pulley etc for loading and unloading Cookers are provided for convenient material handling. The Cookers are to be installed on platforms with grates, chimney, dampers etc. for operating with biomass fuels.

**(ii) Meat Mincer:** This medium-duty motorised machine with SS body is for mincing the cooked meat emanating from the Cooker. It is supplied with extra plates for different output sizes.

**(iii) Bone Crusher:**This machine powders the digested bone from the Cooker to yield bone meal.

(iv) **Vibratory Sieve:** This sieves the Bone Meal to desired size as per user specifications.

(v) **SS Tallow Clarification Vessels:** Tallow tapped off from the cooker is clarified in SS vessels.

(vi) **SS Drying Tray:** Cooked and minced flesh is gently dried on SS trays over an open hearth to yield Meat Meal.

**Other equipments**

The following other items are also required in the plant :

- Flaying Bed
- Hoist with chain & pulley
- Cleaver, knives, apron, handtools etc
- Wheel barrows
- Tallow Storage SS bins
- Balance (500 kg.)

### 2.1.4 Essential requirement for setting up of carcass utilization plant

- **Raw Material availability:**At least 4-6 carcasses should be available in a radius of 6-8 kilometers per day for viable operations.
- **Infrastructure:** Adequate water supply should be available
- **Logistics** :Vehicle for transportation of carcasses is needed
- **Workshed** :A covered area of about 1200-1500 sq. ft. is required

"CSIR-CLRI Technology for Collection of fallen Carcass and its Utilization" is enclosed at **Annexure I**

## 2.2 Incineration: -

Incineration is the thermal destruction of carcasses by auxiliary fuel such as diesel or natural gas etc. or by using electric energy. It reduces carcasses to ash and is generally bio-secure.

This technology can be applied as:

- fixed, whole-carcass incineration,
- mobile air curtain whole carcass incineration,
- municipal incinerators,

**Fixed whole carcass incineration** occurs in an established facility in which whole carcasses or carcass portions can be completely burnt and reduced to ash. This process is normally fuelled by natural gas.

**Mobile air curtain whole carcass incineration** is a mobile system which can be taken on-site. Whole carcasses can be burnt and reduced to ash using wood as a fuel. Because it can be used on site, there is no requirement for transportation of the animal material. It also produces effective inactivation of pathogens and may actually achieve higher temperatures (1000 deg.C).

**Municipal incinerators** are pre-established facilities which are normally used for the burning of household waste. Although they may not be currently licensed to burn carcasses, use of these facilities allows an expanded capacity for effective inactivation of pathogens.

### 2.3 Deep Burial: -

Burial is a method in which carcass is buried in the ground. It is a common and oldest method of carcass disposal and requires thoughtful selection of the burial site. After deep burial, carcass is covered with covered with slaked lime, bleaching powder and crystal salt to address environmental issues related to deep burial.

### 2.4 Other methods

Other methods of disposing carcass include pyre burning, composting etc.

## 3.0 Environmental Issues associated with Carcass Disposal Methods: -

Environmental issues associated with different carcass disposal methods are mentioned below:

### 3.1 Rendering:

Environmental issues related to carcass rendering process are odour as well as trade effluent generated from various process steps followed for rendering. Besides, solid waste is generated from the Effluent Treatment plant

### 3.2 Environmental issues of Incineration: -

Environmental issues related to incineration are emission of flue gases causing air pollution and disposal of remaining solid waste.

### 3.3 Environmental issues of Deep Burial: -

- Deep burial may cause soil contamination if pathogens inactivation is not carried out.
- It can also lead to ground water contamination, particularly in cases where ground water table is shallow.

### 3.4 Pyre burning

Scientific analysis is required to assess environmental impact due to burning with focus on increased dioxin levels and groundwater contamination.

## 4.0 Control Measures:

### 4.1 Transportation of Carcasses to Disposal Site: -

i. Separate system should be instituted for collection of carcass.

ii. The transport of materials must be carried out by vehicles, which are easy to clean and disinfect. The bottom of the vehicles must be water proof to prevent infective material or liquid from leaking out during transportation

iii. It should not be overloaded - half a metre or more (depending on distance to be travelled and temperature) should be left clear for expansion of carcasses.

iv. Carcasses should not be slashed before loading. Vehicles should travel slowly to avoid splashing of contaminated material.

v. Staff should carry a supply of an approved disinfectant and basic equipment to deal with minor spills during a journey.

vi. The diseased animal should not be touched without protective clothing and gloves

vii. All vehicles must be cleaned and disinfected before leaving the premises and after unloading.

viii. The quantity of wash water generated during cleaning of vehicles should be connected to Effluent Treatment Plant (ETP) only and should not be allowed to discharge directly on land

## 4.2 Carcass utilization plant

i. The parameters of concern in the effluent generated from a carcass utilization in the effluent include BOD , COD,TSS & O&G. The effluent is biodegradable and a combination of anaerobic and aerobic treatment system or two stage aeration system may be adopted for treatment of the effluent. O&G Trap is to be essentially provided to treat the effluent generated from the plant. Disinfection method using chlorination should be adopted for treatment of effluent prior to discharge . Effluent generated from various process steps to be treated in ETP and treated effluent should comply with Standards for water pollutants notified under E(P) Act, 1986 or as may be prescribed by SPCBs/PCCs.

ii. The operations in the rendering plant release a huge amount of steam. Without proper ventilation, the working conditions may become incongenial. Therefore, the building should be well ventilated.

iii. The rendering plant emits a large quantity of obnoxious gases, since it handles dead, even decomposed animals also. In such cases, it is preferable to have one of the following arrangements for reducing the odour.

   a) Pass the fumes from the rendering vessel into the boiler stock where they are burnt and dispersed.

   b) Disperse the hot vapors in cooling water where they are dissolved and discharged into the effluent disposal system. The equipment is called condenser

   c) Chemical treatment like chlorination or absorption by activated carbons.

   d) Generally, dry rendering equipment produces much less offensive odours than wet rendering.

iv. The sludge generated from the ETP has to be dewatered and disposed-off properly, as per directions of respective state pollution control boards. Also the process solid waste generated from the

carcass utilization plant has to be properly treated/ disposed-off, after recovery of valuable products.

v. As personnel hygiene is important, arrangement must be made for the workers to wash and change clothes while leaving the plant after their work is completed.

vi. The room for salting and storing of hides must be easy to clean and disinfected. The floor and walls should be covered with tiles and sewerage for waste water should be provided.

vii. To minimize the danger of infection, it is necessary to keep the hides in salted condition for at least for 14 days before delivery to the tannery.

viii. Precautions must be taken to prevent the entry of animals and birds to this section.

ix. The various units of the plant should be so chosen so as to provide a continuous uninterrupted flow of operations between each individual unit of equipment without exposing the materials to air contamination. Wherever possible, a covered screw conveyor may be installed to transport any material from one point of processing to the other.

x. The carcass utilization should be operated under the supervision and control of Veterinary/Animal Husbandry Department of the State and the Local Bodies

**4.2 Measures to be taken for Incineration:-**

i. Complete combustion of carcasses to be ensured.

ii. Air pollution control devices should be installed and the emission from incinerators should comply the General Emission Standards mentioned under Standard for incineration section in SWM Rules,2016

**4.3 Measures to be taken for Deep Burial:-**

(i) It is crucial to select a site which is well-protected from people and scavenging animals. General factors to be considered are:

- Accessibility to disposal site by heavy transport vehicles;

- Nature of soil/rock formation in the available area;
- Level of water table: The deep burial site should be relatively impermeable and no shallow well should be close to the site. The ground water table level should be a minimum of six meters below the lower level of deep burial pit
- Proximity to habitation and water catchment areas, bores and wells: The pits should be distant from habitation, and sited so as to ensure that no contamination occurs of any surface water or ground water. The area should not be prone to flooding or erosion
- Presence of services such as water, gas, electricity, telephone lines, drainage, sewerage and other improvements or structures, including aerial lines;

The location of the deep burial site should be authorised by the prescribed authority.

(ii) A pit or trench should be dug about 2 meters deep. Lime should not be placed directly on carcasses, because in wet conditions it slows and may prevent decomposition. A layer of 10 cm of soil shall be added to initially cover the wastes. The pit should be half filled with waste, then covered with lime within 50 cm of the surface, before filing the rest of the pit with soil. Lime is added to pits, to prevent earthworms from bringing contaminated material to the surface after pit closure.

(iii) It must be ensured that animals do not have any access to burial sites. Covers of galvanised iron/wire meshes may be used.

(iv) Burial must be performed under close and dedicated supervision.

(v) The institution shall maintain a record of all pits for deep burial.

## 5.0 Status of carcass disposal in India

(i) Methods currently adopted for carcass disposal include rendering, incineration and deep burial, of which deep burial is the most common practice for carcass disposal in the country. Very few cities have carcass

utilization plants and incinerators. One such carcass utilization plant is installed in Delhi and incinerator is under installation in Chandigarh.

(ii) Carcass disposal sites are yet to be identified in most of the states

(iii) Most of the disposal sites are not scientifically developed

(iv) The disposal sites do not have necessary approvals ( Consent, Authorization ) from the regulatory bodies in most of the cases

## 5.0 Role of concerned organizations

### 5.1 Implementing agencies:

The implementing agencies shall include Municipalities / Department of Animal Husbandry of the States. States may involve NGOs, SHGs, Co-operatives.

The following provisions of the Section 393 of India Code Disposal of dead animals (Disposal of dead animals) should be implemented by these agencies

*(1) Whenever any animal in charge of any person dies, the person in charge thereof shall within twenty-four hours either—*

*(a) convey the carcass to a place provided or appointed under section 352 for the final disposal of the carcasses of dead animals, or*

*(b) give notice of the death to the Commissioner whereupon the shall cause the carcass to be disposed of.*

*(2) In respect of the disposal of the carcass of a dead animal under clause (b) of sub-section (1) the Commissioner may charge such fee as he may by public notice prescribe.*

The implementing agencies to ensure the following:

- No person shall deposit or otherwise dispose of the carcass or parts of any dead animal at a place not provided or appointed for this purpose
- Bye law to be framed by the local bodies for imposing of Penalty for non compliance of above. Spot fine in the range of Rs.100 to 5000 may be imposed based on the scale of. Such spot fines

may be imposed and collected by officers and Supervisory Staff authorized by the Municipal Authorities including Police personnel. The amount of fine imposed, if not paid on the spot, shall be recoverable in manner deemed appropriate by the Municipal Authority."

- A citizen charter has to be put in place by the local body for prompt disposal of carcasses in a time bound manner, with services which run 24X7. Accordingly, a dedicated on-call service should be established at ULB level for citizens to avail collection and transportation and disposal of animal carcasses.
- The District Magistrate or District Collector or as the case may be, the Deputy Commissioner shall facilitate identification and allocation of suitable land for setting up carcass disposal facility to local authorities in his/her district.
- The local authorities and Panchayats shall facilitate construction, operation and maintenance of carcass disposal facilities and associated infrastructure on their own or with private sector participation or through any agency, adhering to the guidelines issued by the Ministry of Urban Development from time to time and standards prescribed by the Central Pollution Control Board.
- Adequate buffer zone and green belt to be provided around the carcass disposal site to minimize the impact of the carcass disposal on human habitation
- The fund for setting up of the facilities may be obtained from schemes like National Livestock Mission or Animal Husbandry Department of the States.
- Based on pollution load generation a comprehensive wastewater treatment facility, solid waste management including gaseous emission/ odour control measures shall be implemented by the operator of the facility for carcass disposal.
- The local authorities and Panchayats shall make an application, obtain authorisation and consent for setting up carcass disposal

facility from the State Pollution Control Board or the Pollution Control Committee.

5.2 **Regulatory bodies**

- The regulatory bodies to ensure that the implementing agencies provide necessary infrastructure for carcass in areas falling in their jurisdiction
- The concerned State Boards shall grant consent & authorization to such carcass disposal facilities, after ensuring that necessary measures have been taken to control environmental pollution from such sites
- The respective State Boards shall regularly monitor the activities of such facilities to ensure that the emissions and discharges are within the stipulated norms.

**6.0 Conclusion**: -

a) Carcass should be utilized by adopting rendering process or incineration and priority may be given to carcass utilization plant which are run by adopting rendering process at all the major towns to process the dead animal carcasses in a scientific manner.

b) Carcass disposal to be done under the supervision Veterinary/Animal Husbandry Department of the State and the Local Bodies.

c) Disposal of carcasses through deep burial method may be adopted only in where facilities listed in 6 (a) & (b) above are yet to be developed. Deep burial with adequate precautions may be adopted in case of mass mortality that may result from vagaries of nature or a mass die-off due to communicable disease, to avoid zoonotic transmission

d) Scientific analysis required to assess environmental impact due to burning with focus on increased dioxin levels and groundwater contamination

e) The implementing agencies to ensure that necessary infrastructure required for utilization and disposal of carcass is set up in the area under their jurisdiction

f) The regulatory agency to ensure that necessary pollution control measures are implemented and monitor to ensure compliance with the stipulated norms

Annexure I

# CSIR- CLRI Technology for Collection of fallen Carcass & its utilization

| | | |
|---|---|---|
| 1. | Name of Product / Process/Technology | **Collection of Fallen Carcass and its utilization** |
| 2. | Application / Use | It involves integrated utilization of all tissues of fallen carcass for value added product. Finds application in Animal feed/Leather industry/Fertilizer/Chemical Industry |
| 3. | Salient features of technology/process | It is an eco-friendly and sustainable technology developed by CLRI for total utilisation of fallen animals (cattle and buffalo). It provides economically useful products from waste. The process includes lifting of fallen animals, flaying techniques, preservation of hides and skins, rendering (cooking) of the flayed carcass, preparation of meat meal, bone meal, tallow, besides treatment of effluent waste water and utilisation for agri-horticultural purposes and conversion of rumen contents into manure. Transportable devices for effective collection of fallen carcass are enclosed in Annexures 1 & 2. |
| 4. | Raw materials | Fallen animals (cattle and buffalo) |
| 5. | Machinery/Equipment | Flaying tools, wet rendering cooker, meat mincer, bone crusher, drier and pulveriser, transportable flaying and lifting device. |
| 6. | Status of technology | Well developed and available at CSIR-CLRI. |
| 7. | Minimum economic unit and total investment | 3-4 carcasses per day<br>Rs. 20 lakhs.(It may go upto Rs.40Lakhs when transportable device is included) |
| 8. | Technology transfer methodology | As per CSIR guidelines |
| 9. | Technology demonstration – cum – Training facilities | Demonstration can be done at Bardouli, Gujarat or some other location, if possible. |
| 10. | Product acceptability | Excellent Market potential |
| 11. | Marketability | Highly potential |
| 12. | Is this technology locationspecific?<br>If so, please elaborate | Need to ensure availability of 3-4 carcasses per day within a radius of about 30 Kms. |
| 13. | Any gender-bias in technology utilisation? | No. Traditionally flaying activities are carried out by males in rural areas. |

| | | |
|---|---|---|
| 14. | Is any video-cassette available on the technology? | Requires to be arranged, if necessary. |
| 15. | Any other relevant information not covered above | The centre can cater to the needs of a group of villages within a radius of 15 Kms. The likely benefits provided by the technology is not only economical but also in social and environmental spheres provides employment to rural poor and clean environment. Efficient carcass recovery not only reduces losses but also facilitates the availability of cheap and quality leathers to rural folk. Production of quality meat meal, bone meal would help to prepare animal feeds of better quality and help the feed industry to be less dependent on imports. |
| 16. | Terms and conditions for technology transfer | Negotiable under the framework of CSIR guidelines. |
| 17. | If required, can you provide prototype/working model for display/demonstrations | Yes |
| 18. | Name and address of technology generating institute/ individual | CSIR-Central Leather Research Institute, Adyar, Chennai - 600 020, India. |
| 19. | Name and address of technology transfer agency, if different from above | Same as above (Sl. No.18) |

Contact address:
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**Annexure 1**

| | | |
|---|---|---|
| 1. | Name of the Device | **Transportable Device for lifting of Carcass** |
| 2. | Application / Use | ➢ Collection of fallen animal especially in rural areas.<br>➢ Ensure economic utilization of the hide/skin and even other body parts of a dead animal.<br>➢ Ensure cleanliness of environment by not allowing it to be spoilt by the putrefaction of carcass. |
| 3. | Salient features | The device can be fitted on the rear side of a vehicle and can be operated by a flayer cum driver to lift the animal and also flay the hide if the animal is dead. This device has several advantages over the existing methods presently used for lifting animals. The device has tremendous potential to improve the availability of quality hides from fallen animals to Indian leather industry if used by flayers and their societies in the country. The device also ensures proper collection of the remaining parts of the carcass for further processing into valueadded products like bone meal, meat meal, tallow etc. |
| 4. | Any other relevant information not covered above | It ensures economical utilization of fallen carcass, while keeping the environment pollution free. The knowledge lead has been applied for patent protection (Indian Patent application no. 200Del2007). |
| 5. | Name and address of technology generating institute/ individual | CSIR-Central Leather Research Institute, Adyar, Chennai - 600 020, India. |

**Annexure 2**

| | | |
|---|---|---|
| 1. | Name of the Device | **Transportable Device for lifting and flaying animals** |
| 2. | Application / Use | ➢ Collection of fallen animal especially in rural areas.<br>➢ Ensure economic utilization of the hide/skin and even other body parts of a dead animal.<br>➢ Ensure cleanliness of environment by not allowing it to be spoilt by the putrefaction of carcass. |
| 3. | Salient features of technology/process | An improved transportable device for flaying of fallen animals from rural and urban areas has been innovated. The design features are exclusive for lifting and flaying of dead animals. The device is mechanized vehicle which uses power transmission system for loading, hoisting for flaying, carrying and unloading of the fallen animals. It has several advantages, in view of its (a) easy operability (b) reduction in time for flaying (c) provision for carrying and unloading two large or three small dead animals after flaying (d) hydraulic or mechanical system which increases efficiency (e) drastic reduction (by 50%) for capital investment (f) designed exclusively for flaying of dead animals. |
| 4. | Any other relevant information not covered above | It ensures economical utilization of fallen carcass, while keeping the environment pollution free. The knowledge lead has been applied for patent protection (Indian Patent application no. 269DEL2011). |
| 5. | Name and address of technology generating institute/ individual | CSIR-Central Leather Research Institute, Adyar, Chennai - 600 020, India. |