



## Hotbox –Thermal Insulators

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In Ireland, A person is bound under Irish law by the Animal Welfare Act 2013 to take all steps necessary to ensure that “The animal is kept and treated in a manner that – (i) Safeguards the health and welfare of the animal and (ii) does not threaten the health and welfare of the animal or another animal”. Farmers must ensure that all buildings and structures used to contain animals are constructed and maintained in a manner so that they do not cause injury or unnecessary suffering to the animal.

A person who fails to comply with this is committing an offense. This legislation aims to safeguard animal welfare and provide optimum chance of survival for the animal. All animals must be treated properly and given the correct housing and feed stuffs to enhance survival. A person must ensure that an animal has access to clean uncontaminated food, drinking water, shelter, warmth, light, ventilation and exercise. Failure to comply with animal welfare legislation can lead to a fine, imprisonment or both. The length of prison sentence and cost of the fine depends on the offence/number of offences committed by the person.

Hypothermia is defined as “the condition of having an abnormally low body- temperature” (Hawkins 1988). In humans, hypothermia is divided into four stages of severity; mild 32-35°C, moderate 28 - 32°C, severe 20 - 28 °C and profound, less than 20°C (Alva et. al. 2013). Hypothermia can be classified as primary or secondary. Primary results from environmental exposure despite heat production levels by the body being normal and is thought to be the most common cause of cold related deaths (Smith et al. 2011). Secondary hypothermia results from changes in heat production due to a variety of medical conditions (Smith et al. 2011). Studies have found that people suffering trauma combined with a body temperature below 32°C have little or no chance of survival (Jurkovich et. al. 1987)

Hypothermia (chilling) is more common in lambs born outdoors in wet and cold conditions. The breed of the lamb can also play an important role in its susceptibility to hypothermia. Some breeds can become susceptible to hypothermia immediately after birth (Sykes et. al 1976). Lambs with hairy coats can conserve heat more efficiently than lambs with fine coats (Alexander 1962). To survive, the newborn lamb must be able to retain body temperature. Studies have shown newborn lambs that are behaviourally slow at birth show reduced ability to maintain body temperature (Dwyer and Morgan



2005). Lambs born through caesarean section can also have a lower body temperature in the hours after birth compared to lambs born naturally (Clarke et. al. 1997). Normal body temperature of a lamb is 39°C to 40 °C (Mannion 2017), below this level the lamb is hypothermic. Between 37°C and 39°C the lamb is suffering from mild hypothermia, while below 37°C, the lamb is suffering from severe hypothermia (Martin 1999). Symptoms of mild hypothermia include shivering and weakness (Phelan et.al 2011), symptoms of severe hypothermia include the lamb's inability to hold its head up or the lamb may even be unconscious (Greiner and Wahlberg 2009). The most accurate method of taking a lambs temperature is by using a rectal thermometer.

In Ireland, sheep farmers can produce lamb for the Easter Market. This results in lambs being born from December onwards, often during adverse environmental conditions, notably cold temperature and heavy precipitation (rainfall). Mortality rates of young lambs can be very high if a lamb is born premature, undernourished or bonding with the mother does not occur. Hypothermia is the biggest killer of young lambs in the first 48 hours of life (Mannion 2017). The lamb's ability to move following birth is also significant as inability will reduce the lamb's chance of receiving colostrum from the mother. Without this, hypothermia can quickly set in as the lambs body temperature falls rapidly. Colostrum is the first milk secreted by mammals after birth and is produced for up to 18 hours after birth (Greiner and Wahlberg 2009). It is a source of nutrients and antibodies (Cronin and Tiernan 2011) and also assists the lamb to use its own energy reserves to generate heat (Martin 1999). Over the years farmers have frequently used heat lamps or warm boxes to increase the lamb's body temperature. This, along with housing and colostrum can reduce the level of lamb mortality.

Heat lamps or warm boxes are used to increase the lamb's body temperature. There are many different brands on the market and they vary in price depending on their complexity. There is a significant variation in the containers farmers use to put the lamb in while it is under the heat lamp. Timber boxes, wicker baskets and metal boxes are just some examples of these containers. Some farmers simply make a bed of straw and use no container. Some farmers have self contained warm box units. The air around the lamb needs to be between 37°C and 40°C. Many farmers have no temperature sensors in the container and rely simply on assessing the lamb's temperature by feeling its nose.

This project aimed to create a box made from recycled materials that is a practical and functional in design. It aimed to provide a structure that would retain the heat provided by the Heat lamp, thus reducing the length of time the heat lamp needs to be lit. However, care must be taken not to increase the temperature too high, which will cause the lamb to go into shock, increasing the mortality risk.

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**Links to clips on YOUTUBE on heat lamps**

<https://www.youtube.com/watch?v=GnTIVWKE9D0>

<https://www.youtube.com/watch?v=S9vcNOXuHvc>

<https://www.youtube.com/watch?v=NqCeID1IWQI>

<https://www.youtube.com/watch?v=RL5mpR-OWXM>

<https://www.youtube.com/watch?v=cU6katicpM>

<https://www.youtube.com/watch?v=Ri5H4lnIutM>



<https://www.youtube.com/watch?v=3-od8CKPoZI>

**Links to clips on YOUTUBE on hypothermia in lambs**

<https://www.youtube.com/watch?v=mTi6k6C2dXA>

<https://www.youtube.com/watch?v=3PUIKPa-eDw>

<https://www.youtube.com/watch?v=m8re6OZ0HvE>

<https://www.youtube.com/watch?v=WshOKJHURzI>