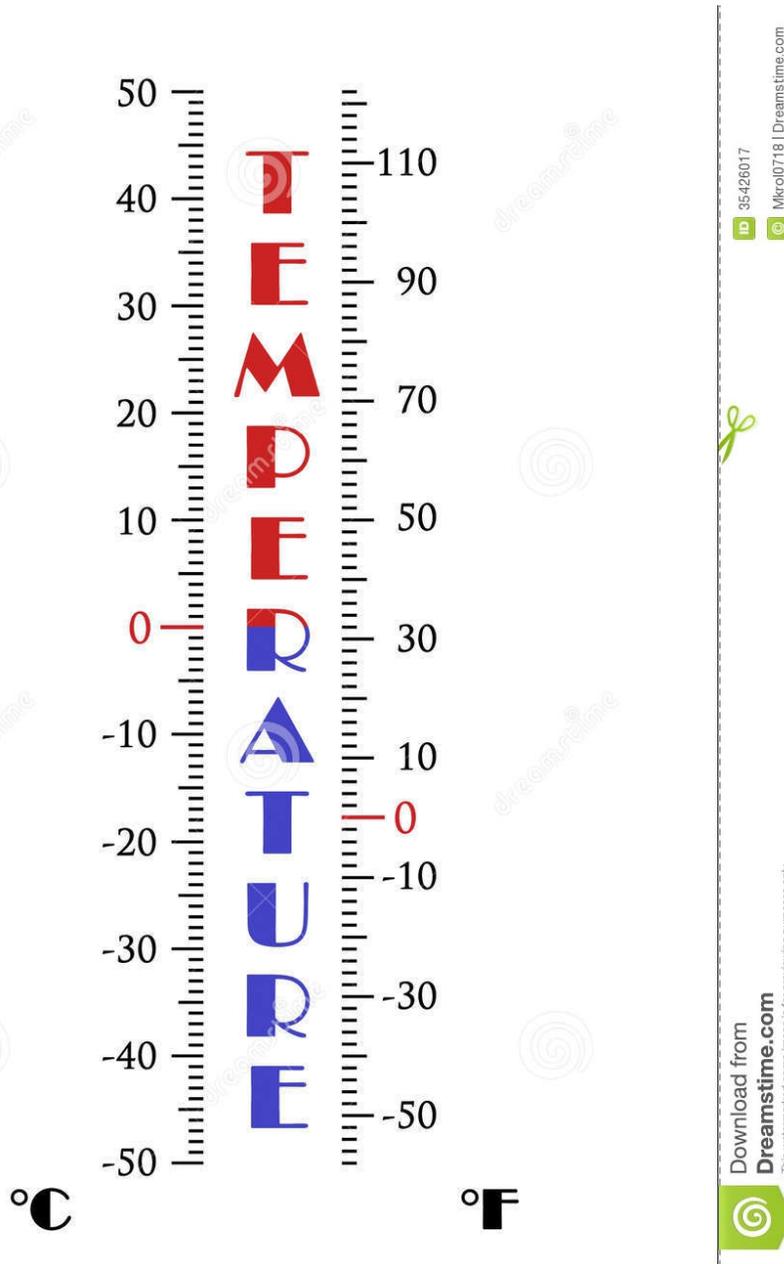


Hypothermia in Newborn Lambs

This Factsheet is one of a set of three concerning lamb survival: "Assisting the Ewe at Lambing", "Care of the Newborn Lamb". They should be read together. '



From David Henderson Book

Normal temperature: 101 -102 F (38.5 - 39.0 C)

Increased temperature: > 103 F (39.5 C) think infectious problem

Decreased temperature: 99 - 101 F (37.5 - 39.0 C) = mild hypothermia

< 99 (37 C) F = severe hypothermia

Introduction

Many newborn lambs die, not from disease, but from hypothermia (chilling). This is especially true in Ontario, where many ewes produce in the coldest months of the year to have lambs ready for the Easter market. Even a newborn lamb at grass in May can be vulnerable ([Figure 1](#)). By careful shepherding of the ewe from conception to delivery, and the perinatal care of the new born lamb, many deaths can be avoided.

Figure 1. Straw bales can provide good shelter for lambs at grass.

To maintain its body temperature, the newborn lamb must produce as much heat as it is losing to the environment. If the lamb cannot do this, its body temperature will start to fall, and, if not remedied, lead to death. The rate of heat loss is influenced by several external factors:

1. Body surface area:body weight ratio. A small lamb has a larger surface area in proportion to its weight ([Figure 2](#)). Therefore, it will chill faster than a larger lamb. This risk is greater for lambs born as triplets or quads.
2. Insulation from the coat. Some lambs are born with a thicker coat than others; compare a newborn North Country Cheviot lamb to a Charollais. Once the lamb is dry, the heavier coat will give more insulation, thus the lamb will lose less heat.
3. How quickly after birth the ewe licks the lamb dry. Lambs from maiden ewes, or the later lambs from a multiple birth are the most vulnerable in this regard.
4. Drafts. Lambs born in a drafty pen or outside with no shelter from the wind will have an accelerated heat loss.
5. Environmental temperature. A lamb loses body heat faster, the lower the surrounding temperature.

The heat production mechanism uses the fat reserves, mainly brown fat, laid down during pregnancy and oxygen to produce energy and heat. The starter for these processes is a component of the colostrum. The lamb must nurse the ewe within a few minutes of birth.

The producer can influence many of these factors by:

- selecting a breed or cross which is suited to the operation, e.g., inside lambing against May lambing at grass
- winter lambing in a draft free but well-ventilated building
- being there during lambing to watch the ewes and ensure that all lambs are dried and start to nurse as soon after birth as possible.

This may mean using some form of oestrus synchronization at the breeding season to concentrate lambings into a short time period and to reduce the labour requirements.

Lamb birth weight is influenced by placental size early in pregnancy. By ensuring correct nutrition in the early stages of pregnancy, good placental development can be assured.

Heat Production

To maintain body heat after birth, the lamb must use its' own energy reserves to generate heat. This

energy reserve is mainly brown fat stores laid down in pregnancy. With oxygen these are converted to energy plus heat. The trigger to start this process is a component of the ewe's colostrum. The fat reserves are limited, and must be complimented by a steady supply of milk from the ewe; the lamb must be suckling regularly in the critical first days after birth to maintain its energy reserves.

Adequate fat reserves at birth for the lamb are derived from the ewe via the placenta during the last half of pregnancy. Ewe nutrition in this period is critical. Not only are the reserves being laid down, but the lamb is rapidly developing. Poor nutrition will result in a small, weak lamb at birth with little internal body fat. This lamb is already at risk, but being weak it will not nurse quickly and may be slow to start breathing. Being oxygen deficient and lacking the "kick start" from colostrum, heat and energy production will be low; the lamb will rapidly become hypothermic. This occurs within the first five hours after birth.

Twelve hours or more into life, a lamb is again vulnerable. Soon after birth the heat mechanism was working but now the energy reserves are used up. The lamb is not able to replace these reserves from the ewe; heat production slows and again the lamb becomes hypothermic. This time the cause is starvation; inadequate milk from a ewe that is feeding another lamb, has chronic mastitis with little milk, or was inadequately fed during late pregnancy.

Recognizing Hypothermia

The only accurate way to recognize hypothermia is by taking the lambs rectal temperature ([Table 1](#)). Use a thermometer that measures subnormal body temperatures (many clinical thermometers do not go low enough). Many of the electronic thermometers do and are more robust for the barn than the traditional mercury/glass versions. The lower the rectal temperature, the more severe the hypothermia.

The rectal temperature of a dull weak lamb, that seems unable or unwilling to suckle, should be checked immediately. The sooner remedial action can be taken, the better are the lamb's chances of survival. The normal rectal temperature for a new born lamb is between 39°C and 40°C.

Treatment

The basis of treatment of the hypothermic lamb is to warm it up and provide a source of energy to start heat production again. Treatment varies with the degree of hypothermia as indicated by the rectal temperature ([Figure 3](#)).

Mild Hypothermia

The lamb's rectal temperature is between 37°C and 39°C. The lamb is weak but may be able to stand. It should be moved into shelter, dried off if wet, and fed colostrum by stomach tube. Using a stomach tube is comparatively simple. '

The operator sits with the lamb restrained on the lap. The tube is passed into the side of the mouth in the space between the front and side teeth ([Figure 4](#)).

Using gentle pressure, the tube is slid into the oesophagus and down to the stomach ([Figure 5](#)).

The tube will move easily, any resistance or coughing indicates that the tube has entered the windpipe. It should be removed immediately. The accidental passing of colostrum into the lungs will result in the death of the lamb with an aspiration pneumonia.

From David Henderson

TREATMENT FOR MILD HYPOTHERMIA

- 1) Remove from ewe and towel dry
- 2) Tube feed with colostrum at 20 mls/lb (50 mls/kg)
- 3) Place in warming box
- 4) Return to ewe when rectal temp. normal
- 5) Be sure ewe accepts lamb

Table 1. The appearance and behaviour of hypothermic newborn lambs.
[After F.A. Eales, 1983, "Hypothermia in Newborn Lambs", in *Diseases of Sheep*, edited by W.B. Martin]

Age (hours)	Cause	Appearance and Behaviour				
		35°C	30°C	25°C	20°C	<20°C
0 - 5	Long delivery Immature lamb	Weak but can stand	Recumbent	Coma	Deep coma	Death
12+	Low heat production	Recumbent	Coma and death			

Figure 4. Using the stomach tube.



Figure 5. Lamb with stomach tube into stomach.



Figure 6. Stomach tube in place before attaching syringe with colostrum.

Small lambs, under 1.5 kg (3 lbs) at birth, may not have sufficient fat reserves to initiate heat production, even with colostrum. These can be fed an equivalent amount of 20% dextrose solution by stomach tube as an energy source ([Figure 6](#)).

The lamb can stay with the ewe provided she is in a sheltered area. The lamb should be watched to ensure that it is suckling. Once the rectal temperature has returned to normal, it and the ewe can be returned to the flock.

Severe Hypothermia

Once the rectal temperature falls below 37°C more radical treatment is required. There are two parts to this treatment:

1. reverse the hypoglycaemia
2. warm the lamb.

The lamb should not be given colostrum until it has been revived; the rectal temperature must be above 37°C.

1. Reversing The Hypoglycaemia

The blood glucose of this lamb will be low. A 20% dextrose solution at a dose rate of 10 mL/kg body weight is injected into the abdominal cavity (intra peritoneally). The site for the injection is about 2 cm (1 in.) below the navel and 2 cm (1 in.) lateral to the midline ([Figure 7](#)). Use a large (60 cc) syringe and a 20 or smaller gauge 1 inch needle, inserted at 90° to the body wall. This is the injection site. Ask your veterinarian to show you how to do it. The internal organs will be pushed away by the needle and not damaged. Both the conscious and comatose lamb can be injected in this manner. Only the lamb able to swallow should be fed by stomach tube.

Figure 7. The site of intra peritoneal injection of glucose solution as indicated by the syringe.



How to make up 20% dextrose solution

Calculate total amount needed and multiply this by 0.4 to determine how much 50% solution to use. Example: 5 kg x 10 mL/kg = 50 mL of 20% solution needed. 50 mL x 0.4 = 20 mL of 50% solution. Draw this amount into syringe. Then draw up the difference as boiling water. This solution will be close to body temperature.

From Premier 1 website <http://www.premier1supplies.com/sheep-guide/2013/01/saving-hypothermic-lambs/>:

IP dextrose injection is a bit more complicated. The most straightforward explanation I've seen can be found at the Alberta Lamb Producer's Association website:

<http://ablamb.ca/documents/factsheets/intradex.pdf>, which adapts its procedure from David Henderson's excellent, but very British, Veterinary Book for Sheep Farmers, available here http://www.premier1supplies.com/detail.php?prod_id=103&criteria=books

The Alberta site makes reference to a typical 4.5 kg lamb, which is about 10 pounds. Adjust the dosage so that your lamb gets 5 ml per pound of the 2:3 solution of dextrose and freshly boiled water (see chart). In the interest of sanitation and sharp needles, I like to use two brand new needles: one for drawing up the solution, and one for the injection.

Dosage chart for mixing IP dextrose injection for various lamb weights

Dosage chart for mixing IP dextrose injection for various lamb weights			
Lamb weight	Total injection	50 percent dextrose	freshly boiled water
5 lbs	25 ml	10 ml	15 ml
7 lbs	35 ml	14 ml	21 ml
10 lbs	50 ml	20 ml	30 ml
13 lbs	65 ml	26 ml	39 ml
15 lbs	75 ml	30 ml	45 ml

- See more at: <http://onpasture.com/2014/01/13/saving-hypothermic-lambs/#sthash.Oe7tYnq.dpuf>

From David Henderson,

- 1) Equipment required:
 1. - 20g x 1-1 1/2 inch sterile needle
 2. - 60ml sterile syringe
 3. - antiseptic spray (tincture of iodine)
 4. - 50% dextrose solution
 5. - freshly boiled water
- 2) Preparation of solution (for average 4.5kg lamb)
 1. - draw 20mls of 50% dextrose into the syringe
 2. - draw 30mls of freshly boiled water into the syringe and mix gently
 3. - this mixture will be an appropriate temperature for injecting
- 3) Administration of solution
 1. - hold lamb by forelegs with body hanging down against your legs.

2. - injection site is 1" below and 1/2" to the side of the navel
 3. - spray site with antiseptic
 4. - insert needle pointing towards the tailhead
 5. - inject the solution slowly over 10 - 15 seconds (no resistance should be felt)
 6. - you may inject the lamb in the neck with long acting antibiotics
- 4) Lamb can now safely be placed in the warming box
 - 5) Check temperature of lamb every 20-30 minutes until rectal temp is 99 degrees and lamb is conscious. Feed (colostrum is newborn) . Return to warming box until temp is 101 degrees (Premier 1).

back to document

2. Warming

The lamb also needs to be slowly warmed to restore body temperature. The best method is to use a "warming box" where the lamb is placed in a container heated by warm (37°C-40°C) moving air (box at same temp – 37-40 degrees C or 99-104 degrees F (most mention 100-102F) ([Figure 8](#)). Always use a warm air heater rather than the more severe heat lamp at this stage.

The rectal temperature should be checked every 30 minutes to avoid overheating above the normal rectal temperature (hyperthermia).

Once the lamb's rectal temperature has reached 37°C, (99 degrees F) it should be removed from the warmer, given a feed of colostrum by stomach tube, then returned to the ewe, or, if it is still weak, placed in an "aftercare" unit ([Figure 9](#)). Do not return the lamb to the ewe unless it is strong enough to nurse unaided. (Premier 1: say return lamb to warming box until rectal temp goes up to 101 degrees, then return to mother and observe to ability to nurse. Continue to tube feed if not nursing, warm prn, look for "why").

Colostrum

Once the lamb's rectal temperature has reached 37°C, its heat production system should be restarted with colostrum. Give colostrum by stomach tube at 50 mL/kg body weight. Usually there is little problem with the ewe refusing the lamb after treatment.

Ewe's colostrum is obviously the best, but cow colostrum can be used. Collect and freeze the colostrum in 500 mL batches. Thaw it in a water bath at 35°C, never in a microwave as this will denature the complex proteins in the colostrum.

As in all conditions, prevention is the best cure for hypothermia. Good nutrition during gestation, good lambing quarters, observation of the ewe and lamb at lambing and assisting where necessary, will go a long way to preventing lamb losses from hypothermia.

Caring for the Hypothermic Lamb

