

Prevention and Management of Pneumonia in Dairy Calves

For Irish Farmers, Advisors and Vets

CalfCare Leaflet Series Vol.6, Ver. 1.



CALF HEALTH PROGRAMME

THIS GUIDE IS PART OF A SERIES OF LEAFLETS ON VARIOUS
IMPORTANT ASPECTS OF CALF HEALTH

1. Calving and Care of the Newborn Calf
2. Colostrum Management
3. Management of the Scouring Calf
4. Early Nutrition and Weaning of the Dairy Calf
5. Management of the Suckler Calf at Weaning to Prevent Pneumonia
6. Prevention and Management of Pneumonia in Dairy Calves

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CALF HEALTH PROGRAMME



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Why do calves get pneumonia?

Pneumonia in dairy calves is often referred to as a 'multifactorial disease'. This means that besides infectious agents, a multitude of environmental and management factors and their interactions are responsible for the outbreak of disease (Figure 1).

Many of the infectious agents commonly involved in calf pneumonia are actually present in healthy calves and on farms without causing pneumonia outbreaks. However, these agents can cause pneumonia if the resistance of the calf to disease is reduced. Any one or a combination of the environmental and management factors outlined in this leaflet can make calves more susceptible to disease.

The recommendations in this leaflet refer mainly to dairy replacement heifers that are reared on the farm where they have been bred. If male calves born on a dairy farm are kept for beef production they should also be managed according to these recommendations.

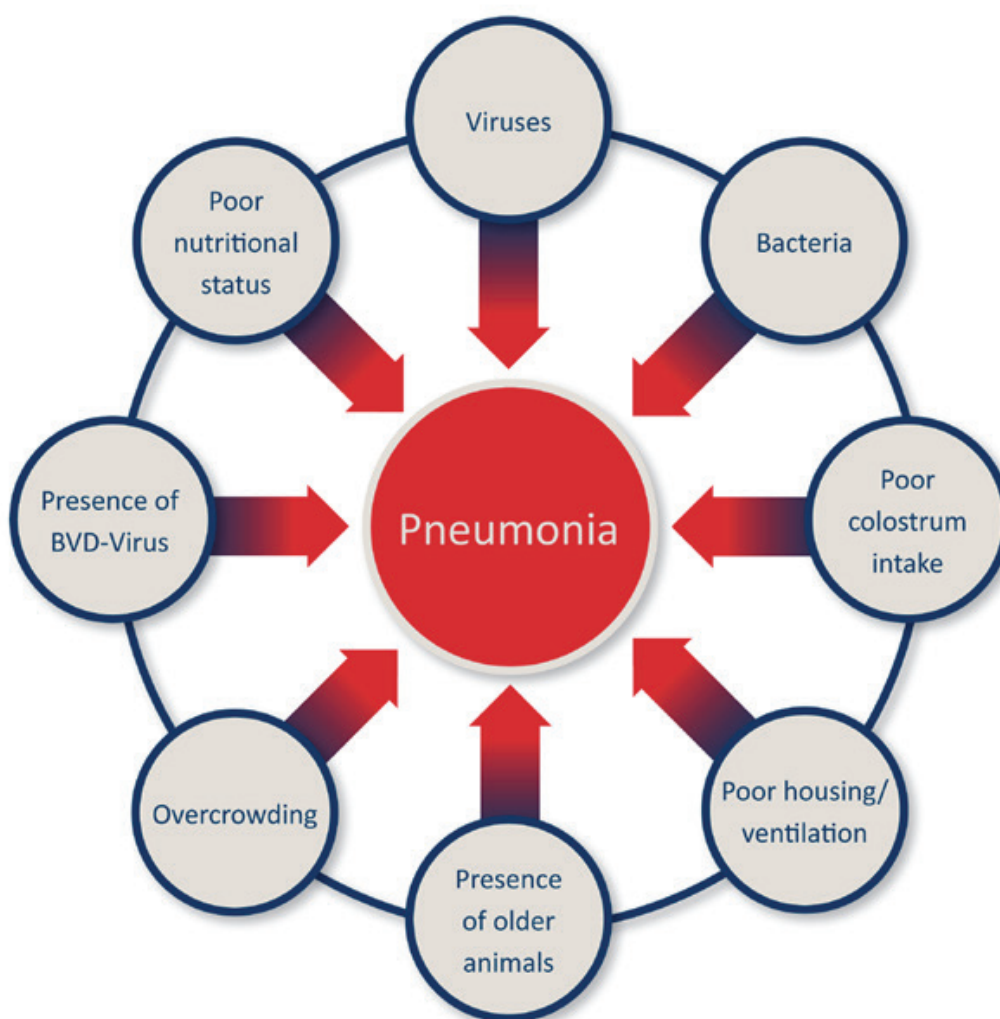


Figure 1: The multifactorial nature of calf pneumonia

How do you recognise a calf with pneumonia?

Early diagnosis is essential for successful treatment. If you suspect calf pneumonia consult your own veterinary practitioner on early diagnosis and advice on treatment and prevention.

Initial signs of pneumonia may be non-specific such as:

- Being 'Off form'
- Dullness
- Reduced feed intake
- 'Hollow sides'
- Fever (over 39.5 °C).

Other signs may include:

- Increased respiratory rate
- Watery discharge from the nose and eyes.

**Early
diagnosis and
treatment is
essential**

Careful observation of calves at a time when they are resting is required to pick up these signs. Checking the calves at feeding times only may reduce the likelihood of detecting a calf with pneumonia, as the signs of the disease may not be as obvious when the calf is feeding.

Therefore, in addition to checking the calves at feeding times, observe them at least twice a day at a time when they are resting.

Later signs of pneumonia include pus-like nasal discharge, and severe respiratory distress. By the time these are noted the disease is advanced.

High risk periods occur after grouping or mixing of groups, after weaning off milk or milk replacer, and in unfavourable or changeable weather conditions.

Which viruses are involved?

The most important viruses associated with pneumonia are Bovine Respiratory Syncytial Virus (BRSV) and Bovine Herpes Virus 1 (the virus that causes Infectious Bovine Rhinotracheitis (IBR)). Parainfluenza-3-virus (PI3) and Bovine Coronavirus (BCV) may also be involved. These viruses can lower the resistance of the calf's respiratory tract making it easier for bacteria to invade the lungs, or they can cause disease on their own.

Which bacteria are involved?

The most common bacteria affecting dairy calves with pneumonia are *Mannheimia haemolytica* and *Pasteurella multocida*. In more chronic cases of pneumonia *Trueperella pyogenes* can be found. Bacterial infection often follows a viral infection, and can cause severe damage to the lung tissue if left untreated or if treatment is started too late.

Which parasites are involved?

Lungworms are of particular concern for respiratory problems for young calves that have been put out on grass early. See our leaflets on Parasite Control for further information www.animalhealthireland.ie.



This calf is a very advanced case of pneumonia and if it had been treated earlier it would have a better chance of survival.



Consolidated lungs identified at post mortem indicates pneumonia.

How should a calf with pneumonia be treated?

Veterinary advice should be sought on the treatment and control of suspected pneumonia outbreaks.

Antibiotics are ineffective against viral infections. However, where bacterial involvement is suspected, antibiotic treatment is required. If antibiotics are not used appropriately (i.e. the correct drug for the disease, for long enough and in the correct dosage), there is an increased risk of creating bacteria that are resistant to further treatment.

No matter which antibiotic is used, the most important factor for treatment success is to start treatment very early in the course of the disease and to treat for long enough (at least for another two days after the signs of disease have disappeared). Revert to the veterinary practitioner if the response to treatment is not as expected. Treatment of calves with oral antibiotics is not recommended as diseased calves often have a reduced appetite and will not receive a therapeutic dosage of the drug. In this case, there is a likelihood of favouring the development of antibiotic resistance. Injectable antibiotics should be used instead.

In rare cases, lungworm infection may cause the pneumonia in young calves and these will not respond to antibiotic treatment. Discuss with your own veterinary practitioner if you suspect either of these problems.

**Prevention
of pneumonia
is better than
treating
outbreaks**

Why does treatment sometimes fail?

If calves already have severe trouble breathing, or pus running from their noses before treatment is started, it may not be possible to cure them.

If calves are not treated early enough and for long enough at the first signs of pneumonia, the surviving harmful bacteria may start growing again and the calf may relapse with recurrent bouts of pneumonia.

Calves that suffer repeated and/or severe bouts of pneumonia may end up stunted for life. Such calves appear healthy after the signs resolve but do not achieve the same growth rates as the healthy heifers in the group and may never reach an appropriate size for breeding. The cause of this poor performance is permanent lung damage and pleurisy from pneumonia.

Antibiotics work ONLY against bacteria, thus in the rare cases of severe viral disease they will not succeed in curing the calves.

Your own veterinary practitioner can also advise on the need to treat all animals within the group.



Treat calves with the correct dosage for long enough

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How can you improve the resistance of your calves?

1. Ensure good colostrum intake

Good colostrum intake is the first and most important step to provide the newborn calf with good immunity. If you follow the 1-2-3 of colostrum management, you can be certain that your calves will get off to a good start (Figure 2). See our leaflet on Colostrum Management www.animalhealthireland.ie.

Colostrum 1 - 2 - 3 for dairy calves



Figure 2: Colostrum 1- 2- 3 for dairy calves

2. Ensure good nutrition for growing calves

After the first feed with colostrum, good nutrition is vital for strong, healthy calves. Traditional feeding regimes (2 litres of milk or milk replacer twice daily) provide dairy calves with only about half of the milk they would normally suckle from the cow, and result in calves that are marginally malnourished. It is now recognised that this low level of feeding is not sufficient in order to maximise the health and future performance of calves. Inadequate nutritional intake has a negative effect on the immune system of the calf and leads to a greater risk of developing pneumonia and other diseases.

To ensure that calves grow well and are not marginally malnourished, they should get a daily amount of at least 13-15% of their birth weight (e.g. 6 litres per day for a 40 kg calf) in whole milk or a good quality milk replacer, mixed at 125 g/L water. To promote muscle growth, milk replacers should have high crude protein content (preferably at least 25% on a dry matter basis).

See our leaflet on Early Nutrition and Weaning of the Dairy Calf www.animalhealthireland.ie.

3. Prevent scour and manage outbreaks properly if they occur

Calves that have suffered from scour (diarrhoea) are more likely to develop pneumonia later in life. Both diseases share the same risk factors, and additionally calf scour lowers the resistance of the calves. If calves develop scour, it is important to make sure that they get through the disease with minimum weight loss. Thus, it is important to keep the calves on normal levels of milk feeding throughout the period of diarrhoea. Additionally, oral rehydration solutions should be provided between milk feedings.

See our leaflet on Management of the Scouring Calf www.animalhealthireland.ie.

Keep the calves on normal levels of milk feeding throughout the period of diarrhoea

4. Minimise stress

Any kind of stress will reduce the ability of the immune system to fight infection. In young dairy calves disbudding, in particular, is a painful husbandry measure that is very stressful for the calf.

To minimise stress for calves and reduce the likelihood that they will develop disease following disbudding:

- ensure that disbudding does not coincide with other stressful events, e.g. grouping, re-grouping, change of housing or change of diet
- provide pain management. Discuss with your own veterinary practitioner how you can provide the best pain management for your calves during disbudding and afterwards.

5. Prevent BVD



Circulation of Bovine Viral Diarrhoea (BVD) virus in calf groups is a major contributor to outbreaks of pneumonia. From the 1st of January 2013 every calf in Ireland is being tested for BVD virus. It is recommended that you take the sample (using the modified identity tag) as soon as possible after birth, although not until the calf is dry. If you receive a positive result, isolate the PI calf from the group. All BVD virus positive calves are restricted from sale and culling is recommended.

For further information see the section on the BVD information section of the AHI website <http://www.bvdfree.ie>.



Sick scoury calves should be removed from the group, rehydrated and milk feeding continued.



Straw bales can be used to stop draughts

How can you reduce infectious pressure?

(1) Remove the calf early from the calving pen

The most important sources of infection for the calf around calving are the cow, other cows (if the calf is born in a group calving pen) and the calving pen. Cows not only carry infectious agents that cause scour, but also ones that cause pneumonia. In particular, the IBR virus can be latent in cows in the herd and they can shed it due to the stress of calving. To reduce exposure of the dairy calf to these infectious agents, remove the calf from the calving area immediately after it is born and bring it into clean calf housing.

(2) Good hygiene in the calving pen

Hygiene at calving and in the calving pen is essential as the calf is most vulnerable to infection just after birth. See our leaflet on **Calving and the Care of the Newborn Calf** www.animalhealthireland.ie.

(3) Provide appropriate calf housing

No matter what system is used for calf housing, it is important that calves always have access to plenty of fresh air, without draughts, and a good dry well bedded lying area.

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Should calves be kept individually or in groups?

Calves will thrive in either situation if managed well. There are many calf rearing systems that can be successful if they are well managed and the above basic principles are observed. Legally, calves can be kept individually for the first 8 weeks of life, as long as they have visual and tactile contact with other calves.* It is easier to prevent spread of infection between calves if they are kept individually. Keeping calves in groups makes it more difficult to prevent pneumonia, and the overall risk increases with increased group size.

The risk of pneumonia is increased at the time of grouping of calves after they have been housed individually, when calves of different ages and sizes are placed in the same group, and when different groups are mixed. When forming groups, put animals of about the same age and size together. Once formed, groups should be kept as stable as possible. Ideally, contact between groups should be avoided. Don't put ill or stunted older calves back into a group of younger calves 'to bring them on'.

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Are outdoor or indoor rearing systems better?

Either system, if well managed is suitable for calves. Remember that no matter how calves are housed, they must always be provided with a dry, well-bedded lying area. Young calves will spend approximately 80% of their time lying down. Wet bedding or insufficient bedding underneath calves will draw away their body heat resulting in calves getting 'chills'.

Outdoor rearing refers to systems where calves are either outdoors at all times or have the possibility to move freely between outdoors and an open shelter.

For the prevention of pneumonia, outdoor rearing of calves is generally better than rearing calves indoors. However, calves can be housed successfully indoors, if appropriate ventilation is provided. Unweaned dairy calves should not be kept outdoors without a roofed shelter. Purpose built individual hutches are superior to any other system. In most cases sheltered outdoor group housing is superior for pneumonia prevention in comparison to indoor housing.

Calves that are kept outdoors need more energy to maintain body temperature (thermoregulation) in cold weather, which means that the amount of milk or milk replacer fed may need to be increased in very cold conditions.

If calves are to be housed in individual outdoor hutches, it is advisable to move them into these straight away. If calves are being moved from indoor housing to outdoors, try to do it under good weather conditions. Sudden changes from warm to cold conditions predisposes calves to pneumonia.

For young calves, straw is the preferred bedding material. However, if straw is not available, other bedding materials, such as wood shavings are just as suitable if they are provided in adequately thick layers. Ensure that the bedded floor area is well drained.

Always place mobile calf housing in good sheltered areas against prevailing wind.

Generally, by providing two shelters and placing them in a vee shape facing away from the prevailing wind, good protection will be provided for calves. Move the shelters regularly if the area is getting poached, contaminated or dirty.

Ideally, allow at least 1.2 m² space per calf.

All outdoor shelters and hutches should be appropriately ventilated.



Dry looking beds may be wet - test with YOUR knees



Move calves into outdoor group hutches when weather conditions are good



Portable shelters on well drained ground are very suitable for calf housing. Straw is suitable for bedding.

Why is proper ventilation so important for the prevention of calf pneumonia?

Dust and noxious gases, such as ammonia, irritate the mucous membranes of the respiratory tract and make them more susceptible to infection. Humidity and warm temperatures enable bacteria and viruses to survive longer in the environment than under dry conditions. Adequate ventilation is necessary to remove excess humidity and heat, gases, dust and airborne infectious agents. The provision of adequate air space and ventilation (without draughts) in calf housing will dramatically decrease the risk of calf pneumonia and other diseases.

What are the important points for proper ventilation in calf houses?

- In Ireland, there is a reliance on natural ventilation for calf housing, which means that ventilation is provided by a combination of wind and stack effect.
- The stack effect means that the air that is heated up by the livestock in the building rises, escapes through the outlet area and is replaced by fresh air through the inlet area (Figure 3).
- Ventilation by wind works best when the building is positioned at right angles to the prevailing wind.
- Neighbouring buildings or trees can have a detrimental effect on the ventilation by obstructing airflow.
- Ventilation of sheds where young calves are housed can be difficult on still, damp days, since these animals are not generating sufficient heat to create a stack effect. Sheds for young calves are more difficult to ventilate properly if the width of the building is greater than 10 metres.
- The ventilation rate is dependent on the size of the inlet and outlet areas, and the roof pitch.
- An outlet area has to be provided in the roof or at the apex of the building. Otherwise the warm damp air will lead to condensation under the roof and the humidity will remain in the building (e.g. round roofed haysheds).
- The inlet area at the eaves should be at least twice the outlet area, and should be at least 1.5 m (ideally 2.5 m) lower than the outlets.
- A rule of thumb is to have the width of the outlet area at least 5 cm for every 3 m width of the building, or at least 0.08 m² per calf.
- Further information is available on minimum specifications on housing as recommended by DAFM are available on the Farm Building and Structure Specifications section of their website on S214 and S101. <http://www.agriculture.gov.ie/farmerschemespayments/farmbuildings/farmbuildingandstructurespecificationspdfformat/>.

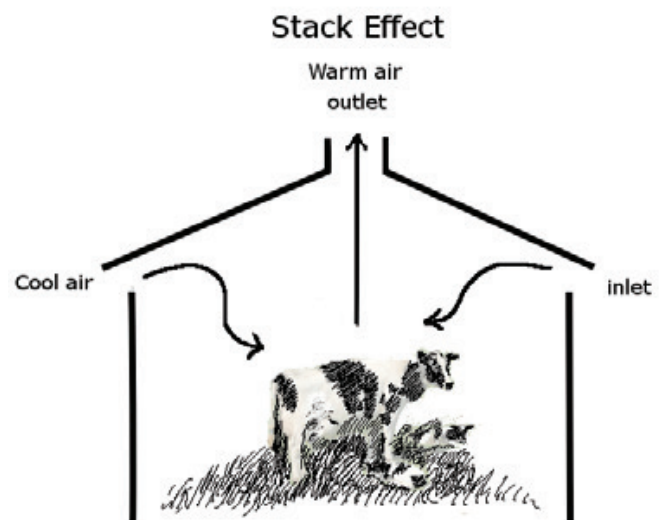


Figure 3: The stack effect is the basis for ventilation in most livestock sheds.

Calves can tolerate low temperatures provided they have a high energy intake, but they are very sensitive to draughts. In practice, air inlets should be above calf height level and the penning area should be laid out so that the currents of incoming air are not directed into the calf lying area. Make sure there are no down draughts from the outlets. Draughts are especially difficult to avoid in open-sided buildings where wind cannot be controlled. Farmers with buildings like these are advised to build temporary walls/shelters to avoid uncontrolled wind impacting on young calves.

In sheds where calves are individually penned, the microclimate at the level of the calves can be very different from the general state of ventilation in the building. Check ventilation in pens by crouching to calf level. If there is a smell of ammonia, it is not well ventilated.

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In order to further check the air movement in calf sheds you may use smoke pellets to test the airflow. Preferably choose a still day for this test and do it while the stock are housed. The smoke should rise and clear through the outlet areas in about two minutes. If that is not the case try to modify outlet and inlet areas. Mechanical ventilation should only be considered if there is no other way to improve airflow.

One of the biggest pneumonia risks for young calves is if they share airspace with adult animals. If possible, calves should be kept away from adult animals to minimise direct exposure to disease-causing organisms.

If calf pneumonia is a problem on a dairy farm, management, housing and husbandry factors should be thoroughly investigated.

One of the biggest risks for calves is sharing airspace with adult animals

Managing purchased calves

Purchasing of calves into a dairy herd always carries the risk of introducing infectious agents, the worst case being infections that have not been in the herd before. An example is *Mycoplasma bovis*, which is a widespread problem in feedlots and bought-in calves and can cause a form of pneumonia (and other diseases) that is very severe and difficult to treat.

- Never keep your dairy heifers together with calves that have been bought in for beef production.
- If you need to purchase replacement heifers preferably do so well after they are weaned.
- Always keep bought-in animals separate from your own stock in a quarantine area for at least a month, preferably in a sheltered outdoor area.
- Where possible buy heifers directly from producers (from as few different sources as possible).
- Ideally buy from producers you know and trust, and be as sure as possible that the calves you are buying have been managed according to the recommendations in this leaflet, and especially that they have had a good colostrum intake.



Checking temperatures of newly arrived calves is good practice

- Check the rectal temperature of bought in calves 1- 2 hours after the calves arrive on the farm to check for signs of illness due to the stress of transport.
- Observe bought-in calves very carefully twice a day while in quarantine and carry out any testing and administer any treatments recommended by your own veterinary practitioner. If you detect fever (over 39.5°C) or clinical signs, contact your own veterinary practitioner for advice.
- Bought-in calves released from quarantine should preferably be introduced to home-reared calves after turn-out to pasture to reduce disease transmission between both groups.

VETERINARY TECHNICAL NOTE:

Is it beneficial to vaccinate dairy calves against pneumonia?

The potential usefulness of vaccination has to be assessed individually for every farm and husbandry situation. Licenced vaccines are available for the common viruses and bacteria associated with calf pneumonia. Ensure vaccines are stored and used in accordance with the manufacturer's recommendations.

Dairy calves are often at risk of pneumonia from birth. If calves get pneumonia in the first weeks of life, consult your own veterinary practitioner to investigate if IBR virus or BRSV are contributing factors.

The maternal antibodies that calves will have acquired from colostrum may not offer sufficient protection against these viruses. In addition, maternally derived colostral antibodies may reduce the effectiveness of some vaccines. To overcome this problem and to offer faster protection in young calves there are some vaccines that can be used intranasally.

Intranasal vaccines cause immunity to be built up locally on the mucous membranes of the respiratory tract. The role of vaccination of the pregnant dam in preventing pneumonia in her calf warrants further research as it may have an effect on colostral antibody levels. However, as already stated, colostral protection against disease may not be complete. If your spring-born heifer calves succumb to pneumonia after housing for their first winter, vaccination can improve the situation, particularly if the course (often two doses 4-6 weeks apart) is completed two weeks before housing. However, vaccination on its own is unlikely to solve all problems if the husbandry conditions are not also addressed. Vaccination should be carried out on the whole group and not just a few individuals.

Ensure vaccines are stored and used in accordance with the manufacturer's recommendations

TECHNICAL NOTE:

Space requirements for housed calves

Calves may be kept in single pens, in groups, or in a combination of both. Legally, individual pens must be wide enough and long enough. The pen width must be the height of the calf at the withers and the pen length must be the calf length plus 10% (measured from the tip of nose to the pin bone)*. Typically, an individual pen would be 1.0m wide by 1.5m long, but 1.7m is recommended, especially for isolation pens.

Space required for calves in group pens varies according to their weight. The minimum permissible pen floor area per calf is 1.5m² and at least 1.7m² is recommended for calves <150kg. As a general guide, a total floor area of about 2.3m² per calf, including the feed passage, is required

Calf weight	Pen floor area	Approx age in weeks
150 kgs	1.5 m ²	19
150 - 220 kgs	1.7 m ²	19- 32
≥220 kgs	1.8 m ²	> 32

Table 1: Space Requirements for group pens

KEY POINTS TO REMEMBER:

1. Early diagnosis and treatment is essential
2. Prevention of pneumonia is better than treating outbreaks
3. If calves are not treated early enough and for long enough at the first signs of pneumonia, the surviving harmful bacteria may start growing again and the calf may relapse with recurrent bouts of pneumonia
4. Keep the calves on normal levels of milk feeding throughout the period of diarrhoea
5. No matter what system is used for calf housing, it is important that calves always have access to plenty of fresh air, without draughts, and a good dry well bedded lying area
6. Don't put ill or stunted older calves back into a group of younger calves 'to bring them on'
7. Check ventilation in pens by crouching to the calf level. If there is a smell of ammonia, it is not well ventilated
8. One of the biggest risks for calves is sharing airspace with adult animals
9. Ensure vaccines are stored and used in accordance with the manufacturer's recommendations

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