

HEIFER RAISING—BIRTH TO WEANING

32) PNEUMONIA

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INTRODUCTION

Pneumonia is the second most common health problem in young calves, after diarrhea.

Respiratory infections include all diseases affecting the entire respiratory tract. In contrast, pneumonia is a term that describes inflammation of the lungs only. Pneumonia is a disease that may vary from subclinical to acute and fatal. Depending on the severity of the infection, damage to the lungs can be temporary or permanent. Calves with chronic pneumonia seldom recover completely and should not be used as replacement animals.

Most respiratory problems occur when the calf is between six and eight weeks of age. They are caused by the interaction of one or more microorganisms with stress (e.g., transport), housing (e.g., ventilation) and nutrition of the calf. Rate of morbidity (the incidence of the disease) is usually high, but the rate of mortality is variable. The major organisms implicated in outbreaks of calf pneumonia are summarized in Table 1.

ORGANISMS

Pneumonia frequently follows other infectious diseases. The organisms associated with the disease often will not cause clinical signs without the presence of predisposing factors. In other words, a healthy calf often does not become sick when infected with a particular micro-organism. However, micro-organisms of different species may reinforce each other's effects (synergistic effect). For example, calves become more severely ill when infected with both mycoplasma (e.g., *M. bovis*) and bacteria (e.g., *P. hemolytica*) than when infected with each agent separately. Sometimes, infections with one agent may weaken the calf's resistance. For example, infection with bovine respiratory syncytial virus (RSV) appears to predispose the lungs to secondary infections. RSV virus damages the ciliated epithelial cells that normally clear the lungs from invading agents.

Infection by viral agents is often followed by a secondary bacterial invasion (especially by *P. haemolytica* and *C.*

Table 1: Microorganisms implicated in pneumonia

Bacteria	Virus	Mycoplasma
<i>Pasteurella multocida</i> ¹	Parainfluenza type 3 (PI3) ¹	<i>Mycoplasma dispar</i> ¹
<i>Pasteurella hemolytica</i> ¹	Infectious bovine rhinotracheitis (IBR) ²	<i>Mycoplasma</i> spp
<i>Corynebacterium pyogenes</i>	Bovine respiratory syncytial virus (RSV)	<i>M. bovirhinis</i>
<i>Neisseria</i> spp	Bovine virus diarrhea (BVD)	<i>M. bovis</i>
<i>Chlamydia</i> spp	Bovine adenovirus	<i>Ureaplasma</i> spp
<i>Haemophilus somnus</i>	Reovirus	

¹ Microorganisms most often isolated from the damaged lungs of calves that died of pneumonia.

² Also called bovine herpes virus type 1.

Calves with chronic pneumonia seldom recover completely and should not be used for replacement.

pyogenes). RSV virus and adenovirus primarily infect the lower respiratory tract (lobes of the lungs). However, many micro-organisms also colonize the upper respiratory tract (nose, larynx, trachea, bronchi).

CLINICAL SIGNS

Although calves may not show acute signs of pneumonia until they are one month old, they may harbor and be afflicted with the micro-organisms at 1-3 weeks of age. Clinical signs are variable and generally are observed in combinations:

- 1) Nasal discharge (thin and watery or thick and purulent);
- 2) Dry cough, especially noticeable after exercise (the cough may persist even after the calf has recovered from the disease);
- 3) Rectal temperature above 41°C (normal = 38.6°C);
- 4) Lesions of the lungs;
- 5) Respiratory distress (difficult breathing or dyspnea);
- 6) Diarrhea.

PREDISPOSING FACTORS

Colostrum feeding (i.e., passive immunity) appears to protect calves for the first month after birth as few cases of pneumonia occur until then. The peak incidence occurs between 40 and 50 days after birth, which corresponds to a low point in the concentration of antibodies in the blood (Figure 1). In healthy calves, immunoglobulin A (IgA) is the immunoglobulin in highest concentration in the upper respiratory tract and the lungs (respiratory mucosa). However, immunoglobulin G (IgG) predominates in

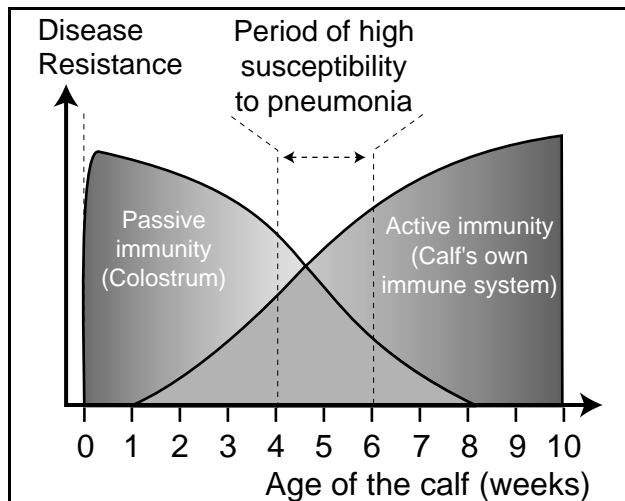


Figure 1: Calves are more susceptible to pneumonia between 4 and 6 weeks of age.

the lungs of infected animals. Blood serum concentrations of IgG greater than 15 g/l seem adequate to protect calves against pneumonia. Calves with reduced immune resistance or under continual assault with a large number of micro-organisms are more likely to develop pneumonia. The calf's resistance to pneumonia may be overwhelmed more easily under feeding, housing and management techniques that are inadequate.

Housing (building ventilation)

Poor ventilation and high relative humidity are often associated with outbreaks of pneumonia. However, other environmental factors also have predisposing actions. For example, concentrations of ammonia and other gases from manure and decomposing bedding may irritate the lungs. Volume and velocity of air in a building affect the concentration of micro-organisms in the calf's environment. Calves are more prone to suffer from pneumonia when they are in the following environmental conditions:

- 1) A poorly ventilated space where gases and microorganisms accumulate;
- 2) A high relative humidity combined with a low environmental temperature

(cold, humid air) and to a lesser extent a low relative humidity combined with a high environmental temperature (hot, dry air);

3) Large diurnal temperature variations.

Management

The following situations increase susceptibility to pneumonia:

- Calves grouped too early and exposed to the microorganisms coming from a sick calf with chronic or subclinical pneumonia;
- Calves weaned when they are not yet eating adequate amounts of solid feed (weaned too early);
- Calves purchased from different sources and placed in pens together and/or transported long distances (stress).

Feeding

Calves fed extremely large amounts of milk or milk replacer with high concentrations of dry matter can achieve rapid growth rates, but appear to be more susceptible to pneumonia. This observation could be due to increased urine output that makes it more difficult to keep the calf dry, or to a decrease in the calf's immune response when it is under the stress of rapid growth.

Selenium deficiency may also be related to high susceptibility to pneumonia; however, experimental data are conflicting at this time.

Adequate intake of colostrum, avoidance of nutritional stress, proper housing and good natural ventilation are effective ways of reducing the incidence of pneumonia.

PREVENTION OF PNEUMONIA

The partial reduction or elimination of the predisposing factors and the improvement of faulty management techniques will reduce the occurrence of pneumonia significantly. Adequate intake of colostrum, proper housing (dry individual pen), good natural ventilation and avoidance of nutritional stress are effective ways of reducing the incidence of pneumonia. Vaccines against several of the implicated microorganisms are available, but they should be considered only when specific agents have been identified. A vaccination program relevant to agents prevalent in an area should be planned with the help of a veterinarian.

TREATMENT OF PNEUMONIA

When a calf becomes sick, early detection is important in improving the likelihood of survival. The calf should be placed in a warm (sunshine), dry, well-ventilated (fresh air) environment. Diarrhea and dehydration can be treated with fluid administration. Generally, antibiotic treatment is aimed at reducing the effect of secondary bacterial invasion.

