PM Case discussion – Sheep with Broncho(pneumonia)

This case discussion about a sheep is to show you how much information you can get out of a PM (when done fresh and properly). Finding out why an animal has died, helps you to maintain the herd's general herd, and to optimize your animal production. We give you the history of the animal, some PM photos, and then follow up with our opinion of the cause of death of the animal as well as management advice.

History

Species:	Sheep
Sex:	Ewe
DoB:	31 May 2016

When the sheep returned from the fields where they normally graze, she started to show signs of weakness. She could not walk or stand. She was given a potent long-acting antibiotics (Excede), but she died in the evening. A PM was performed the next day.

PM diagnosis

Below you find some of the PM photos of the actual case.

Figure 1 Observed from the outside, the ewe appeared to have a good Body Condition Score (BCS)

Figure 2 Overview of the chest- and abdominal organs. It is always important to take such a photo to compare the chest – abdominal organs ratio[1]. Immediately apparent is that the animal was in very good condition (very fat) and the lungs are very dark in colour (almost like the colour of the liver).

[1] PM course; PDF Photography in pathology; page 34

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Figure 3 Here you see the heart, lungs and windpipe (trachea). The lungs are dark and patchy in appearance. A normal lung should be pink, uniformly soft and spongy[2].

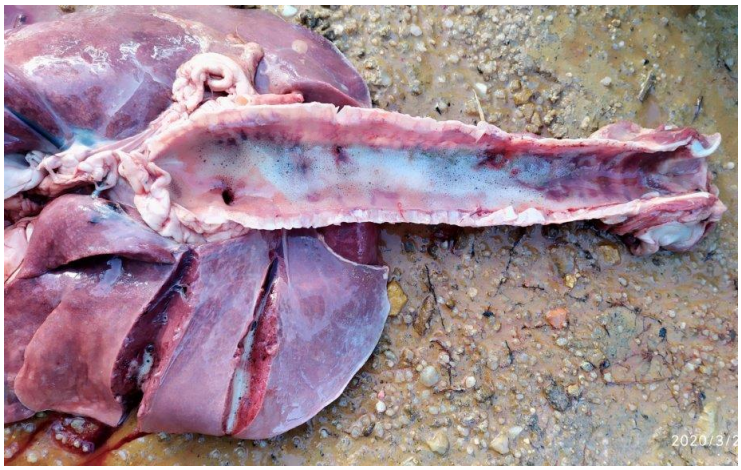

Figure 4 Cuts were made in the lungs to examine the inside, and the trachea was cut open. Note the foam in the trachea, and in the cut surfaces in the lungs. Foam should be limited to the lower 1/3 of the trachea, this is usually due to leaky blood vessels and difficult breathing and is considered normal[3]. What we see here, is abnormal.

Figure 5 The heart appears normal.

Figure 6 The liver shows some early PM changes. The gall bladder (green organ) is mildly enlarged, likely due to reduced food intake before death. Remember that the colour of the bile can sometimes stain the surroundings organs (= bile imbibition[4]), this is a PM change (not visible in photo).

Figure 7 The spleen appears normal although we can't comment on its size because the photo was taken without a reference marker.

Figure 8 The kidneys appear normal. The fat indicates again a good body condition.

Cause of death

Based on the photos and information that was given, we believe the cause of death was acute bronchopneumonia.

[2] *PM course; PDF Specific organ lesions; page 84*
[3] *PM course; PDF PM changes; page 33*
[4] *PM course; PDF PM changes ; page 21*

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Bronchopneumonia in sheep and goats

(Broncho)Pneumonia is the inflammation of lung tissue and conducting airways, caused by infectious agents, mostly bacteria and viruses. This is worldwide one of the most common causes of losses in sheep and goats of all ages and often involves a combination of infectious causes and is triggered by predisposing (management) factors. It is an especially common cause of disease and mortality in lambs and kids, if they did not receive sufficient colostrum or in unvaccinated lambs where passive colostral immunity is waning as well as during weaning stress.

In southern Africa, this is usually a primary bacterial infection (thus without preceding viral infections) caused by *Pasteurella multocida* and *Mannheimia haemolytica*. These bacteria are normal inhabitants of the respiratory system. Under normal circumstances, will cause no problems. However, when the animals are stressed and/or their immunity is compromised, they will invade the lungs and cause pathology.

In the absence of predisposing factors and infections, acute respiratory disease caused by these bacteria is uncommon in adult sheep. Lambs on the other hand often suffer from sudden death or severe acute pneumonia.

Predisposing factors (Conditions that increase the risk): The disease occurs most often in animals that have undergone recent stress such as transportation, weaning, change of diet and/or starvation, overcrowding, or co-mingling with animals from unrelated farms. Weather extremes (esp. cold and wet spells) can also precipitate (trigger) the disease and will aggravate the effect of the other stress factors mentioned.

Note: Poor dosing technique (deworming drugs etc.) will result in an outbreak of **aspiration pneumonia** which can easily be confused with infectious bronchopneumonia.

Symptoms can vary a lot. Mild cases may be limited to a cough and a discharge from the eyes and nose, whereas in more severe outbreaks some animals may be found dead without showing prior symptoms. Untreated animals often die within 12 hours from showing symptoms, but some animals can survive for as long as three days.

In lambs 4 – 12 months old the bacteria may cause sudden deaths due to septicaemia (systemic pasteurellosis where bacteria spread in the blood). In outbreaks involving lambs, up to 40% of the group may be affected with a mortality rate between 2 and 20 %. In older animals the bacteria may cause acute pneumonia with accompanying mortalities, or develop into chronic pneumonia leading to poor production.

Sudden onset depression, lethargy and poor appetite are early signs. Affected sheep become exercise intolerant and thus lag behind the herd. These animals often have a fever of over 40.5°C.

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Figure 9 Animals suffering from a pneumonia typically stand with the head and neck extended and often breathe through an open mouth (esp. after exercise). Breathing is laboured and often noisy with an increased abdominal effort.

Figure 10 Animals suffering from a pneumonia often have a pussy or bloody foamy discharge from the nose. Their eye mucous membranes are congested to cyanotic (red to blue in colour). There may be evidence of dehydration (sunken eyes and inelastic skin).

Diagnosis There is no easy confirmatory test in the living sheep or goats. A diagnosis can be made at post mortem examination.

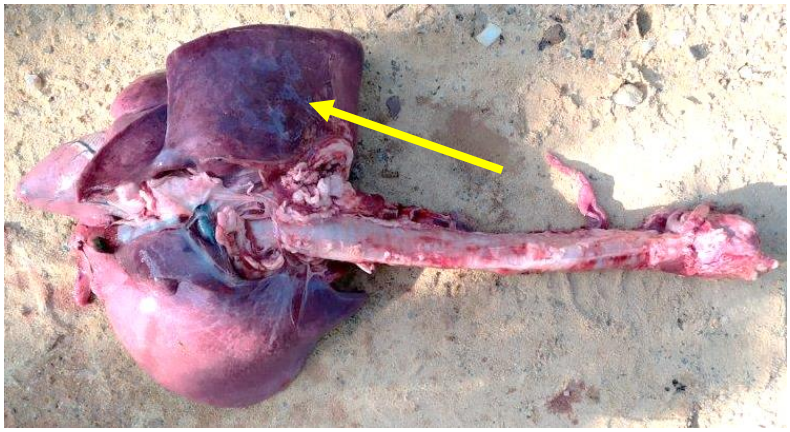

Figure 11 In severe cases of bronchopneumonia the lungs are heavy, swollen and purple-red. They may sink in water as opposed to normal lungs that float. The lower cranial (front) lung lobes (arrow) are typically most severely affected.

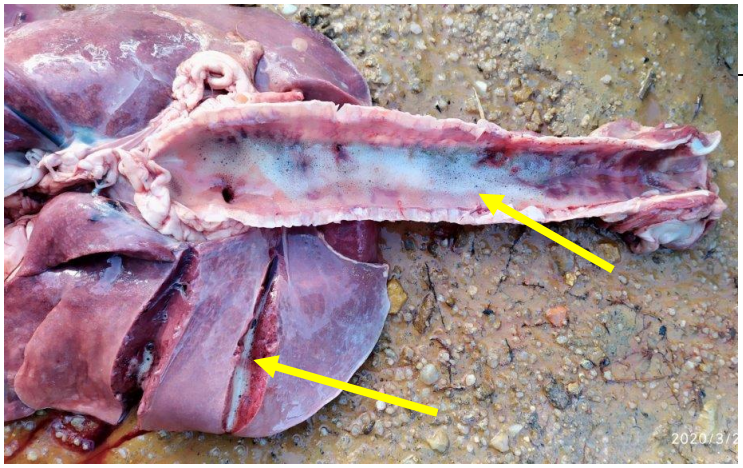

Figure 12 The airways contain blood-stained froth which extends all the way into the lungs (see foam on cut lung surfaces).

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As you probably know, it is always important to collect samples during a PM. Tissue samples for example are sent to the lab. A pathologist will then be able to see several indications of this disease under the microscope.

Histopathology (microscopic examination of the tissues) can identify changes in the cells of the lung tissue that may be distinctive for different types of pneumonia.

When the pathologist checks the lung tissue under the microscope, the lung should sort of look like a fine lace (Figure 13A). Most of the lung tissue is composed of thin-walled alveoli[5], which exchange oxygen and CO2 to the tissues.

Figure 14 shows a piece of lung tissue that is not healthy. The left part (dark part) is consolidated (compacted, thickened). This is the pneumonia. You can see this back in the dark patches on the lung photos (Figure 11). On the right it is healthy (or at least not so bad). The pathologist can recognize a lot under the microscope by looking at your PM samples. Now you can nicely see why you always must take a sample with a normal, and abnormal piece. At the edge of the abnormal, is where the action happens[6]. If you take a swab from the tracheal pus/foam, the pathologist will make a culture of this, and can determine the type of bacteria that is causing the pneumonia. Based on that, we can recommend a certain type of antibiotics.

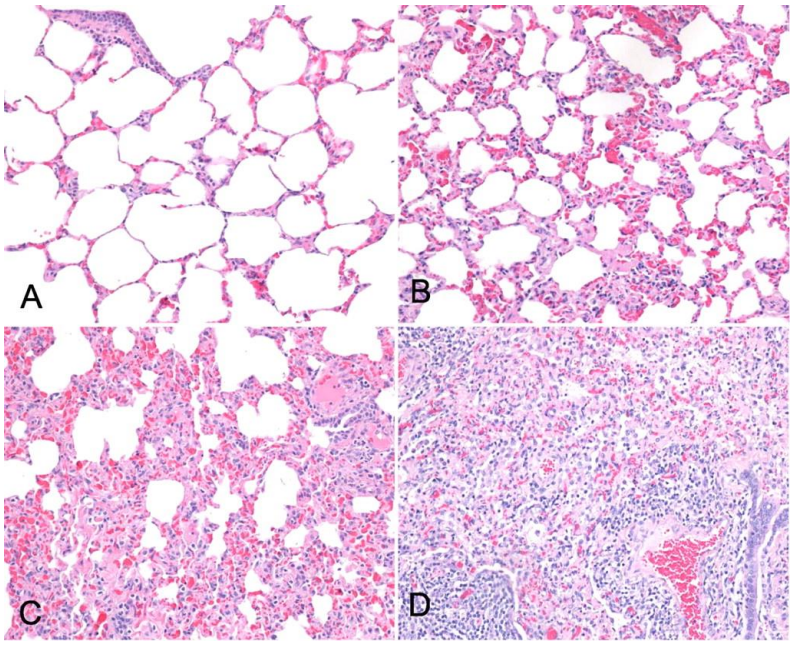

Figure 13 Examples of lung tissues under the microscope; non-infected lung (A), mildly infected lung (B), moderate infected lung (C) and severely infected lung (D). (c) Herrmann-Hoesing et al (2009)

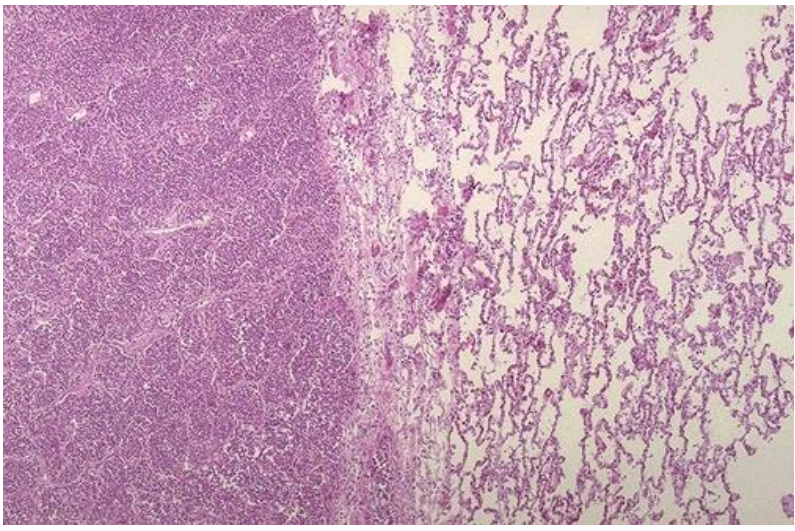
Figure 14 Lung tissue with pneumonia (left – dark consolidated) and more healthy tissue (right – with open spaces). © The University of Utah

<u>Treatment</u> To be effective, treatment must be started as early as possible! Farm workers should thus be trained to identify and isolate sick animals and farmers should not delay treatment.

- Antibiotics – Discuss the choice with your veterinarian. In herd outbreaks or where valuable animals are involved, as well as in acute or chronic cases where initial therapeutic attempts have failed, treatment should be based on bacterial culture and sensitivity against the types of antibiotics.
- Anti-inflammatory treatment is also advised to minimise inflammation.
- Isolate (quarantine) infected animals to prevent spread of disease.

[5] *PM course; PDF Anatomy and Physiology; page 19*
[6] *PM course; PDF Diagnostic sample collection; page 26*

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Prevention and Control: Control and prevention focuses on the correction of the predisposing factors whenever practical. To reduce the risk of pneumonia on a farm a 4-pronged approach should be adopted:

1) Minimise stress factors;
   a. Provide good-quality water and food. Supplement food will build up the animals' immune systems
   b. Evaluate and optimise the animals housing (avoid severe dust, ensure good ventilation, hygiene etc.) and try to soften the effects of sudden environmental changes (esp. cold, wet spells), especially when transporting animals
   c. Apply correct dosing practices
2) Teach farm workers how to monitor and identify sick animals. The earlier treatment is initiated, the better the chances of success.
3) Reduce the bacterial load in the environment. Keep and treat sick animals in a separate dry location. Quarantine new additions to the herd (for 5-7 days) and after introduction into the flock, monitor the whole herd for any signs of pneumonia.
4) Optimise immunity;
   a. Breeding ewes require an initial course of two vaccines 4–6 weeks apart followed by an annual booster 4–6 weeks before lambing. The product used may vary depending on the disease situation on the farm and if combination vaccines against clostridial diseases is desired.
   b. This vaccination regimen provides only passive immunity to the lambs for up to 5 weeks after birth. Lambs immunity should be stimulated with two doses of vaccine administered from 10 days of age and a booster vaccination 4 weeks later. Colostral antibodies do not interfere with development of active immunity from vaccination.
   c. NOTE: In commercial milk producing goat herds there may be a tendency to wean kids too early. Needless to say, the combination of weaning shock and sub-optimal feeding will severely weaken their resistance to infections. The following are weaning guidelines based on scientific research: Goat kids can be weaned earlier than the traditional weaning age of 3 months if any of the following criteria are met:
      i. At 9 kg of body weight
      ii. 8 weeks of age or
      iii. At the time when at least 30 g/day of solid feed are consumed.
      iv. Restricted milk feeding (2 x per day rather than 3-4 x per day) encouraged solid feed consumption by goat kids and reduced labour requirements. These kids had better an increased efficiency of weight gain and were less susceptible to weaning stress.

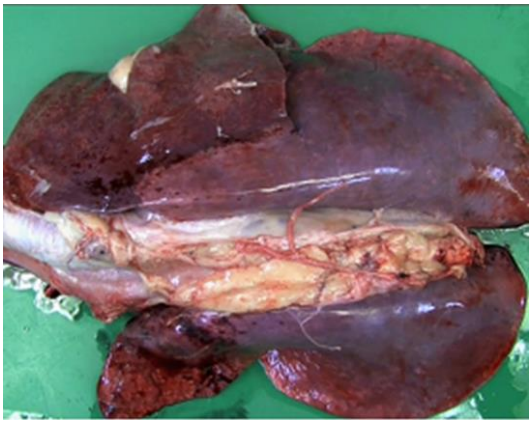

Figure 15 Heavy, swollen and purple-red lungs from a sudden death case caused by pasteurellosis

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