DIAGNOSTIC EXERCISE

From The Davis-Thompson Foundation*

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Question Sheet

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Clinical History: On July 18, 2018, a female Pantaneira sheep presented blindness and mild exophthalmos of the left eye. Two days later, it also had severe dyspnea and remained in sternal decubitus, with lateral torticollis. The sheep died on July 21. On July 24, two additional sheep of the same flock were observed with a mild nasal mucohemorrhagic discharge. When rechecked on July 28, the discharge had become more severe, and the ewes were dyspneic and gasping. There was skull and facial asymmetry due to unilateral exophthalmos. The protrusion of the eyeball favored keratitis and corneal ulceration on Sheep 2. Due to poor prognosis, the ewes were euthanized 34 days after the onset of clinical signs.

To help the reader to properly compare the disease presentation in the three sheep, the clinical and pathological data are summarized in the Table below.

Animal ID / Clinico-pathological picture	Sheep 1	Sheep 2	Sheep 3
Exophtalmos	x	x	x
Nasal discharge	x	x	x
Dyspnea	x	x	x
Nasal cavity lesions	x	x	x
Brain lesions		x	x
Lung lesions	x	x	x
Kidney lesions			x
Outcome	Spontaneous death	Euthanasia *in extremis*	Euthanasia *in extremis*
Observations	Freezing and autolysis artifacts		

Gross Findings: The three sheep had similar *postmortem* gross lesions differing mainly in severity. The head lesions affected essentially the left side in Sheep 1 and 3 and the right side in Sheep 2.

The carcasses had poor nutritional status and scant fat reserves. Sheep 1 and 3 had mild and moderate exophthalmos, respectively. In Sheep 2, a severe increase in volume in the orbital region added to mild tumefaction over the right nasal bone resulted in marked cranial asymmetry (Fig. 1A). The eyeball was not visible since it was covered by reddish, swollen, ulcerated conjunctiva (Fig. 1B). It was pressed and displaced by a granulomatous white mass that occupied part of the orbit. The eyeball was shrunken and structurally disorganized, and the cornea and sclera were thickened by fibrosis (*atrophia bulbi with shrinkage*) (Fig. 1C).

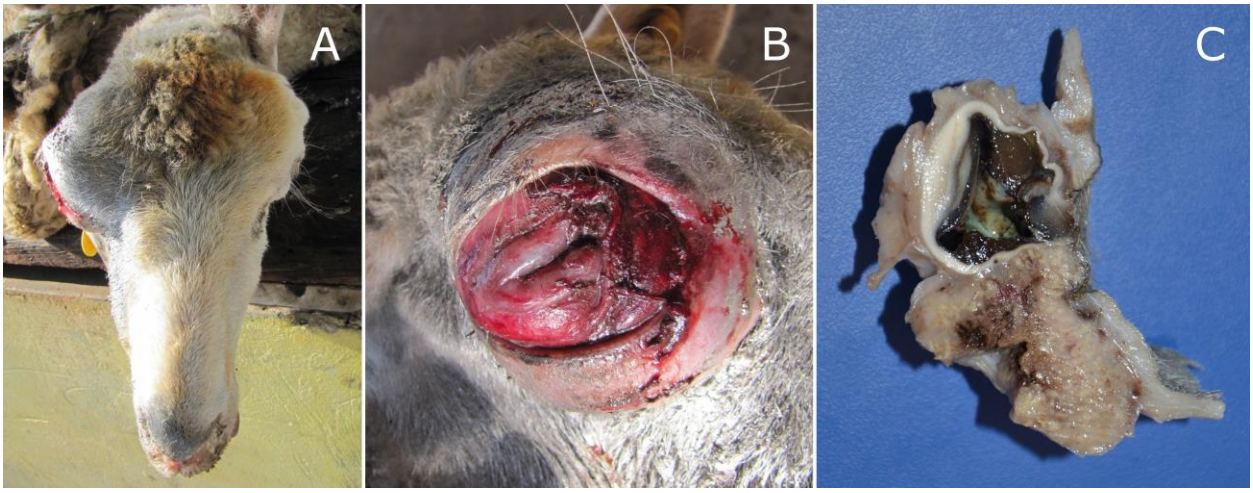


Figure 1. Sheep 2. **A.** Cranium-facial asymmetry, with exophthalmos of the right eye and tumefaction over the nasal bone. **B.** Right eye. The orbital region is severely enlarged. The conjunctiva is markedly swollen, red, and ulcerated. The eyeball can not be seen. **C.** Formalin-fixed specimen. The eyeball is shrunken and disorganized, and the cornea and sclera are thickened by fibrosis.

The nasal bone tumefaction was caused by a 2x0.5 cm mass that expanded the subcutaneous and resembled that from the orbit. Mucohemorrhagic discharge was apparent in Sheep 3 (Fig. 2A), where rare larvae of the bot fly *Oestrus ovis* could be seen in the exudate, and scant in the other. On a mid-sagittal section of the head, the nasal conchae (left side on Sheep 1 and 3 and right side on Sheep 2) were replaced by a large gray, firm-to-soft, multifocal, friable mass of irregular contours (Fig. 2B).

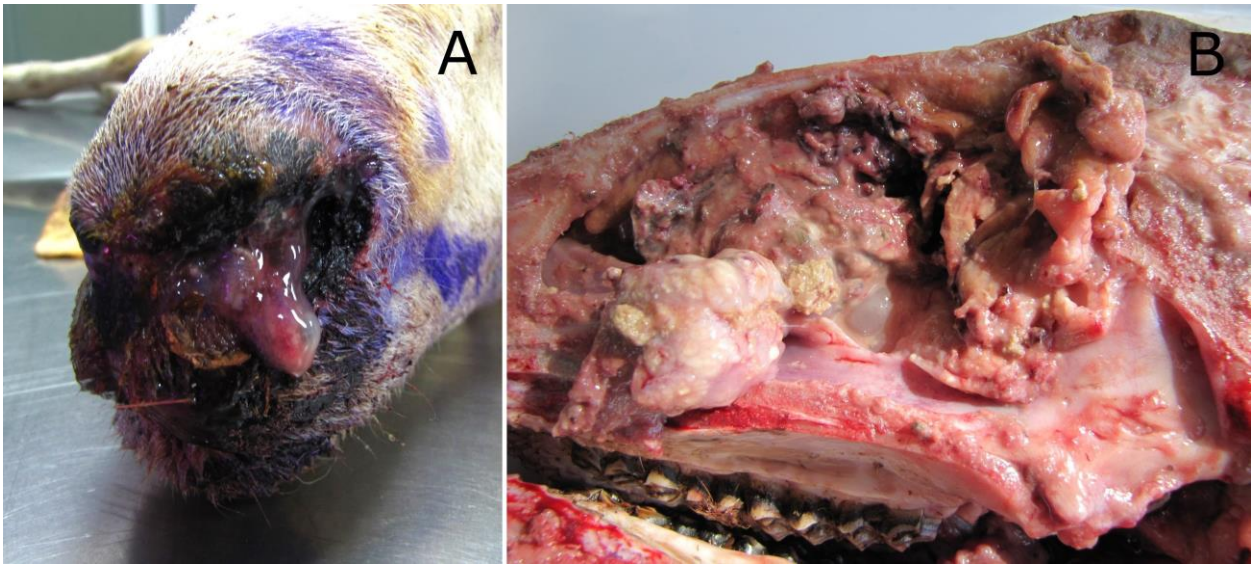


Figure 2. A. Sheep 3. Mucohemorrhagic discharge is apparent in the left nostril. **B.** Sheep 2. Mid-sagittal section of the head, right side. The nasal conchae are destroyed and replaced by a large soft mass of irregular contours. There are multiple foci of necrosis and purulent exudate within the mass.

The mass extended to the pharyngeal region and destroyed the turbinates, invading the cranial vault and reaching the frontal lobe of the brain (Fig. 3A). In Sheep 2 and 3, after the brain hemispheres were removed, an increase in the volume of the olfactory bulb was apparent, which was swollen and dark, and had a caseous lesion at its junction with the frontal lobe (Fig. 3B).

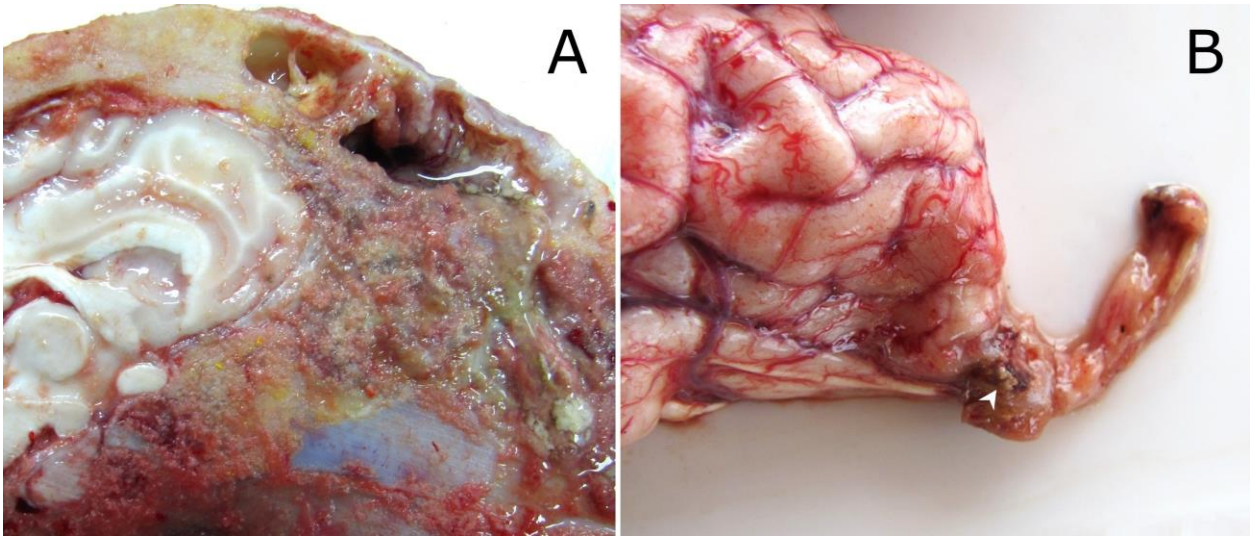
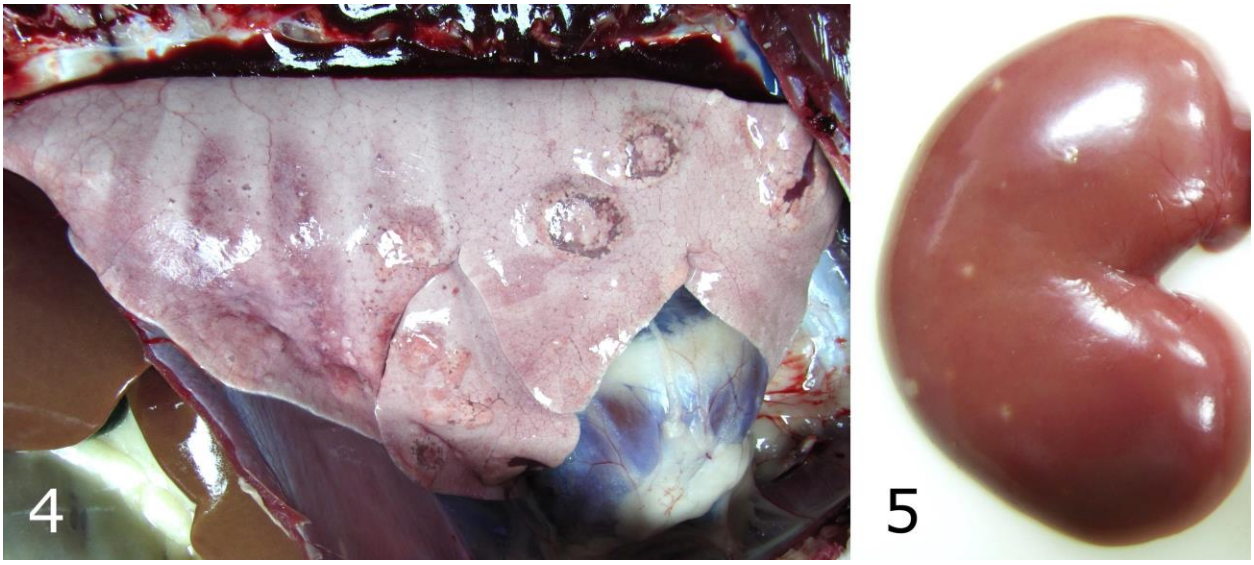


Figure 3. A. Sheep 3. Mid-sagittal section of the head. The left side is completely destructed with loss of nasal conchae, which are replaced by a large mass of irregular contours. The mass invaded the cranial cavity and reached the frontal brain. Note the thickening of meninges covering the frontal lobes. **B.** Sheep 2. The right olfactory bulb is swollen and dark and has a nodular caseous lesion at its junction with the frontal lobe (arrowhead).

In the frontal portion of the cerebral hemisphere, the meninges were thickened, and there was a focal loss of gray matter. The remaining nasal conchae (contralateral side) were intact but moderately congested in all sheep.

In both lungs, several soft, yellowish subpleural nodules of variable sizes (0.5-1 cm in Sheep 2 and 0.5-3 cm in Sheep 1 and 3) were surrounded by a red rim (Fig. 4). In Sheep 3 only, both kidneys had circular pale areas of 0.5-1 cm in the natural surface that extended to the cut surface, occasionally reaching the corticomedullary interface (Fig. 5).



Figures 4 and 5. Sheep 3. **Figure 4.** Right lung. Multifocal yellowish subpleural nodules of variable sizes (0.5-3 cm) surrounded by a red rim. **Figure 5.** Kidney. Circular pale areas of 0.5-1 cm in the natural surface.

Other lesions found at necropsy were considered incidental and included calcified nodules of *Oesophagostomum* sp. larvae in the omentum and one small hydatic cyst in the liver.

Follow-up questions:
- *Morphologic diagnoses*
- *Most likely cause*
- *Differential diagnoses*

*The Diagnostic Exercises are an initiative of the Latin Comparative Pathology Group (LCPG), the Latin American subdivision of The Davis-Thompson Foundation (DTF). These exercises are contributed by members and non-members from any country of residence. Consider submitting an exercise! A final document containing this material with answers and a brief discussion will be posted on the DTF website (https://davisthompsonfoundation.org/diagnostic-exercise/).

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