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PASTEURELLOSIS IN REINDEER IN
NORTHERN NORWAY
A CONTRIBUTION TO ITS EPIDEMIOLOGY

By
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KUMMENEJE, K.: *Pasteurellosis in reindeer in northern Norway. A contribution to its epidemiology.* Acta vet. scand. 1976, 17, 488—494. — Lung inflammations in reindeer caused by *Pasteurella multocida* were reported from Scandinavian countries already at the beginning of this century. Several outbreaks have been recorded in reindeer herds in Norway. Observations made at the fall reindeer slaughtering, and in reindeer herds in Finnmark seem to indicate an endemic state of this infection with subclinical carriers. Predisposing factors and lowered specific immune status may probably play important roles when fatal outbreaks occur.

reindeer; pasteurellosis.

Bronchopneumonia in reindeer caused by *Pasteurella multocida* is not infrequently found in diseased and slaughtered animals. Reports seem to indicate that the disease was well known among the Lapps already at the end of the nineteenth century (*Horne* 1898). Outbreaks of the disease were reported from Sweden in 1912, 1913, 1924 and 1959 (*Magnusson* 1913, *Brandt* 1914, *Nordkvist & Karlsson* 1962). In Norway, similar outbreaks were recorded in reindeer herds in 1911, 1912, 1914, 1956 (*Horne* 1915, *Skjenneberg* 1957), and in recent years in 1966 and in 1973 (unpublished).

MATERIALS AND METHODS

The material described in this report consists of diseased animals from the outbreak in 1973, from single cases of the disease found, mostly occasionally, in reindeer herds in 1973 and 1974. It also consists of lungs collected at the meat inspection during

Table 1. Number of reindeer herds, number of animals examined and number of cases with pasteurellosis.

Herd No.	Number of animals					
	in 1973		in 1974		in 1975	
	exam- ined	with pasteurellosis	exam- ined	with pasteurellosis	exam- ined	with pasteurellosis
1	3	3	8 ¹	3 ¹		
2	3 ²	2 ²	3	1		
3	3 ³	1 ³	4	2		
4	2 ⁴	2 ⁴				
5			20	6		
6			36	4	107	0
7					50	0
8					147	5

¹ Including organs from 1 calf.
² " " " 1 adult female.
³ " " " 1 calf.
⁴ " " " 2 calves.

the fall slaughtering in Finnmark in 1974 and 1975. A survey of the material is given in Table 1.

The usual patho-anatomical, parasitological and histo-pathological methods and staining techniques were used. The bacteriological examinations were performed using blood-agar and brom-thymolblue-lactose agar plates, incubated aerobically and anaerobically for 2 days at 37°C, and also read after 1 day.

P. multocida was identified by its morphology and staining properties, and by its biochemical activities towards glucose, lactose, saccharose, raffinose, rhamnose and indole production. The fermentation reactions were observed for 7 days.

RESULTS

Herd 1

Disease among the calves in this herd was reported in early May 1973. When visiting the herd a few days after receiving the report, some 70 calves were dead, according to the owners. Two calves which had died the same morning were necropsied. A third which was very weak, and with clinical lung symptoms was killed and examined. These 3 calves showed acute bronchopneumonia mostly in the cranioventral parts. In addition, a few inflammatory areas about 2×2 cm were found dorsolateral on

the diaphragmatic lobes. The rest of the calves in this herd were in poor condition. Some of them were coughing and had nasal discharge. They were given injections with antibiotics and with an anthelmintic. In spite of this, a large number of them died before reaching the summer pastures in late June. The winter pastures were reported as being good.

In connection with a research program comprising vaccination for Pasteurellosis and treatment for gastro-intestinal nematodes, 6 reindeer calves were sacrificed in this herd in the period January-April 1974. Clinically, none of the calves showed lung symptoms. Some of them were in poor condition. At necropsy, small inflammatory areas in the ventral parts of the cardiac lobes on both sides of the lungs were found in 2 calves. In addition, lungs and intestines from a seventh calf which died in the winter 1974 were stored by the Lapps for examination. This also showed acute bronchopneumonia.

On bacteriological examination, *P. multocida* was isolated from all lungs with inflammatory changes. In addition, *Dictyocaulus viviparus* was found in the bronchies of all 3 calves examined in 1973.

Herd 2

Heavy losses among the calves in this herd were reported as the herd moved to the summer pastures in early May. On arrival at the coast, the herd was visited and examined. The problems started at about the middle of April. The calves were, at that time, weak, had nasal discharge and some coughing. Two calves were sacrificed for necropsy. The first one was very lean. The only clinical sign observed was abnormal respiratory sounds from the chest, together with a slight nasal discharge. No coughing was heard. At necropsy, bronchopneumonia in the cardiac lobes on both sides was found together with abundant *Dictyocaulus viviparus*. The other calf was also lean, but no lung inflammation was found.

In the early fall, an adult female was found ill and sacrificed by the Lapps. On examination, acute bronchopneumonia was found together with *Dictyocaulus viviparus*.

When visiting this herd again at the winter pastures in January 1974, 3 calves were sacrificed. None of them showed clinical signs of pneumonia. At necropsy, small inflammatory areas in the ventral parts of the cardiac lobes of the lung were

observed in 1 of them, but not in the 2 others. *Dictyocaulus viviparus* was not found.

P. multocida was isolated from all lungs with pneumonia. In this herd, some of the calves were treated with sulphonamides and anthelmintics per os after arrival at the coast in 1973.

Herd 3

In this herd, organs from 3 diseased calves were received for examination in the fall 1973. In 1 of them, acute bronchopneumonia caused by *P. multocida* was found. Trials with vaccination against Pasteurellosis and treatment for gastro-intestinal nematodes were conducted in this herd in 1973/74. In March-April 1974 4 calves, 2 vaccinated and 2 unvaccinated, were sacrificed. At necropsy, the 2 unvaccinated calves both showed inflammatory changes in the cranioventral parts of the lungs, while the 2 vaccinated ones did not have pneumonia. None of the 4 sacrificed calves, or other animals in the herd, showed clinical lung symptoms. The lung inflammations were diagnosed as *P. multocida* infections.

Herd 4

Cases of sudden deaths were reported from this herd in May 1973. Internal organs from 2 necropsied animals were received at this laboratory. Acute lung inflammations caused by *P. multocida* were found in both.

Herd 5, 6, 7 and 8

Samples from these herds were collected at the meat inspection at the fall slaughtering in 1974 and 1975. In herd 5, 30 % of the lungs examined had inflammatory areas in the cranioventral parts caused by *P. multocida*. The corresponding number for herd 6 was about 10 % in 1974, while none were found in this herd in 1975. In herd 7, which had its summer pastures in the same general area as herd 6, cases of Pasteurellosis were not found in 1975. In herd 8, about 3.4 % of the lungs examined were infected with *P. multocida*, with small areas of bronchopneumonia in the cranioventral lobi.

Pathology

The lung inflammations found in the sacrificed and slaughtered animals were subacute bronchopneumonias with an exudate

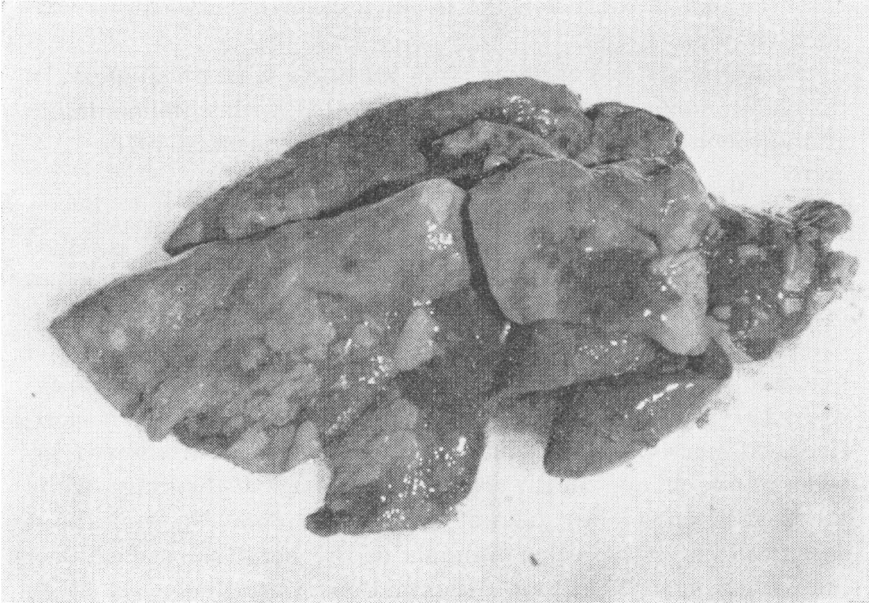


Figure 1. Lung, diseased reindeer calf. Bronchopneumonia caused by *P. multocida* and *Dictyocaulus viviparus*.



Figure 2. Lung, slaughtered reindeer. Bronchopneumonia in lobus cardiacus caused by *P. multocida*.

consisting mostly of polymorphs and mononuclear cells. Fibrin was not observed, or was only slightly present. The inflammations were usually confined to the lower parts of the cardiac lobes. In the diseased calves, more extensive acute bronchopneumonias with a fibrinous exudate were found (Figs. 1 and 2). In herd 4 a fibrinous pleuritis was also present. *Dictyocaulus viviparus* was often found concomitantly with the *P. multocida* infection.

DISCUSSION

Lung inflammations caused by *P. multocida* seem to be more usual and wide-spread in reindeer herds than previously anticipated. The infection has also been shown to occur in a subclinical form without giving rise to regular outbreaks of the disease in the herds concerned. Predisposing factors probably play important roles in the pathogenesis of the disease. In the diseased animals, lung worms (*Dictyocaulus viviparus*) were very often found in addition to the *Pasteurella* infection. The verminous bronchopneumonia may be the most important predisposing factor. Heavy lung infestation with *E. rangiferi* larvae may also lower the resistance to the attendant bacteria. A lowered specific immune status in the herds may also be important in extensive outbreaks.

The micro organism concerned probably persists in the reindeer population in animals with subclinical infections, and probably also as a part of the bacterial flora in the air passages. The bacteria may spread within the herd by direct contact between animals, by flies, and by contaminated pastures (nasal discharges). In this connection the reindeer throat grub (*Cephenomyia trompe*) should be kept in mind. As shown by *Vashkevich* (1972) brucellosis in reindeer can be transmitted by the reindeer skin grub (*Oedemagena tarandi*). The close contact between the larvae of the throat grub fly and the bacteria which may be expected in infected animals makes such a mechanism of transmission probable.

CONCLUSION

Several outbreaks of lung *Pasteurellosis* in reindeer have been recorded in Scandinavia in this century. The source of infection has not been found. The present report indicates that the infec-

tion persists in the reindeer population, either in healthy carriers, or as subclinical infections, or both. Predisposing factors probably play an important part in the development of fatal disease outbreaks. Verminous bronchopneumonia caused by *Dictyocaulus viviparus*, which was found frequently in diseased animals, may be an important predisposing factor. Subclinical infections were found in herds with no previous history of lung inflammation.

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SAMMENDRAG

Pasteurellose hos reinsdyr i Nord-Norge. Et bidrag til dens epidemiologi.

Akutte, fatalt forløpende utbrudd og subkliniske tilfeller av pasteurellosis (*P. multocida*) hos reinsdyr i Finnmark beskrives. Begge formene er påvist hos reinsdyrkalver om vinteren og om våren. Subkliniske infeksjoner er påvist hos klinisk friske slaktedyr ved høstslaktingene. Akutte, fatale tilfeller synes ofte å forekomme hos dyr med verminøs bronchopneumoni (*Dictyocaulus viviparus*). Predisponerende faktorer er trolig ofte nødvendig for at fatale infeksjoner skal oppstå. En nedsatt spesifikk immunstatus er muligens også viktig ved fatale forløp.

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