

From the State Veterinary Serum Laboratory, Copenhagen, Denmark.

A STUDY OF OUTBREAKS OF AUJESZKY'S DISEASE IN CATTLE

III. SELECTED OUTBREAKS OF A SPECIAL INTEREST REGARDING EPIDEMIOLOGY

By
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BITSCH, V.: *A study of outbreaks of Aujeszky's disease in cattle, III. Selected outbreaks of a special interest regarding epidemiology.* Acta vet. scand. 1975, 16, 449—455. — Five selected outbreaks of Aujeszky's disease in cattle from 1974 and 1975 are described. In an outbreak with anterior pruritus, Aujeszky virus was demonstrated in lung tissue of one animal and in nasal secretions of another, which has further substantiated the view that cattle may get infected with Aujeszky virus by the respiratory route. In two of three outbreaks, which were found to be interrelated, and in a fourth outbreak, all with one affected animal showing posterior pruritus, circumstantial evidence was found of a transmission of the infection by man.

cattle; Aujeszky's disease; pseudorabies;
epidemiology.

Parts I and II of the present study (*Bitsch 1975a, b*) were based on the examination of the outbreaks of Aujeszky's disease (Auj. D.) in cattle recorded during the two-year period from December 1971 to December 1973. In the following, five later outbreaks are described which have substantiated the validity of certain views and conclusions advanced in the preceding papers.

One of the five outbreaks showed anterior pruritus, while the rest showed posterior pruritus. Three of the latter outbreaks were interrelated.

HISTORY OF OUTBREAKS WITH RESULTS OF VIROLOGICAL EXAMINATIONS

Outbreak 181.

In January 1974 Auj. D. was diagnosed in piglets by virus isolation. In March-April 1975 one heifer and five cows became affected. There were 15 cows, eight heifers, and 15 calves in the house in addition to about 60 fattening pigs, a boar, and 10 sows, some with sucking piglets. No piglets died, but during a short period up to the occurrence of the disease in cattle fattening pigs showed loss of appetite for one or two days.

Information about the six cases is given in Table 1 together with results of the virological examination.

On the night between April 3 and 4, Animals 5 and 6 were moved to the Royal Veterinary University, Copenhagen. Thanks hereto, material for virological examination was taken as early as 3 hrs. after the death of Animal 6 and immediately after euthanasia of Animal 5. On the first inspection the lungs of Animal 5 appeared quite normal. Tissue was taken from both lungs from areas with a questionable tendency to hyperaemia (Sample I); by thorough cutting, a few small areas with marked hyperaemia were found in the right lung close to the bifurcature (Sample II). Virus was readily isolated and reisolated from the original suspensions (Samples I and II) and furthermore from new suspensions prepared from lung tissue that had been stored at -55°C .

Outbreak 175.

A heifer that had calved on September 14 fell ill 11 days later (25/9). She was euthanasized after about 40 hrs. of illness. Pruritus occurred in the perineal region.

The affected animal and 17 milking cows were stalled only during milking time. There were no pigs on the premises.

Material was received for examination on October 1. Injuries, obviously from the calving, were noticed in the vaginal wall. Virus was demonstrated in the lumbar cord (10^1)*, in a swab from the orifice ($10^{0.5}$) and in one from the mid part of the vagina (10^0), in a sample of the vaginal mucous membrane ($10^{0.5}$) and a swab from the anus (10^0).

* TCID₅₀ per 0.1 ml of suspension.

Table 1. Data on six cases of Aujeszky's disease in cattle (Outbreak 181).

Affected animal	Date of appearance of disease	Site of pruritus	Observed period of illness (hours)	Demonstration of virus***													
				medulla oblongata	cerebellum	medulla thoracalis	medulla lumbalis	swab, nostrils	nasal mucosa	swab, nasal mucosa	tonsillar mucosa	swab, tonsillar mucosa	pharyngeal mucosa	swab, pharynx	lung		
1, heifer	28/3	chest	42**	10 ¹	10 ^{2.5}	10 ¹	—	—	—	—	—	—	—	—	—	—	—
2, cow	1/4	chest	46**	0.3	10 ¹	—	—	—	—	—	—	—	—	—	—	—	—
3, cow	3/4	head	3	10 ^{1.5}	10 ^{0.5}	—	—	—	—	—	—	—	—	—	—	—	—
4, cow	3/4	head	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5, cow	3/4	—*	50**	—	—	10 ^{1.5}	—	—	—	—	—	—	—	—	—	—	—
6, cow	3/4	head	16	10 ¹	10 ^{1.5}	—	—	—	—	—	—	—	—	—	—	—	—

* The animal was observed to lick itself between the shoulders on April 4 in the evening, but no signs of pruritus were seen the following day.

** The animal was killed.

*** TCID₅₀ per 0.1 ml of suspension.

**** Not swabs, but nasal washings taken on April 4 and 5.

Obstetric aid at calving had been given by the owner, while a neighbour had assisted just by pulling a rope. This neighbour, having a pig farm, did not visit the cow-house again before the appearance of the disease.

On September 17 and 18, however, the heifer, showing signs of distress, was attended to by the veterinarian, who on the first day performed vaginal and rectal exploration of the animal.

O u t b r e a k s 1 7 0, 1 7 1 a n d 1 7 3.

These outbreaks occurred in April 1974 within one and the same veterinary practice.

O u t b r e a k 1 7 0. A heifer, on which Cesarean section had been performed on April 10 at the local veterinary hospital by Veterinarian A, fell ill on April 15. She died after about 55 hrs. of illness with signs of pruritus at the site of operation. The head and thoracic part of the spinal cord were received for examination. Virus was demonstrated in the latter (10^1). On the farm there were about 20 sows, 75 fattening pigs, and a boar, all in a house separated from that of the cattle, and no pigs had been brought in for several years except boars from Auj. D.-controlled breeding herds.

O u t b r e a k 1 7 1. On April 17 a cow showed signs of "brain fever". She developed pruritus on the back of her thighs. The head and thoracic part of the spinal cord were received for examination, and virus was demonstrated in the thoracic cord ($10^{2.5}$). There were 23 cows, 11 heifers, and 31 calves in the cow-house. Of swine there were only three or four fattening pigs in a separate house, and no swine had been bought during the last three months. On April 10 in the morning the cow had been treated for milk fever by the assistant to Veterinarian A. Later that same day Veterinarian A gave obstetric aid to her, and on the following day in the morning he treated her for retention of the afterbirth. The afterbirth was removed partially, and antibiotics were deposited in the uterus.

O u t b r e a k 1 7 3. On April 29 an eight-day-old calf showed signs of severe colic. Later pruritus developed on one side of the body. Death occurred after about 36 hrs. of illness. The head and lumbar part of the spinal column were received. Virus was demonstrated only in the medulla oblongata (10^0). The affected animal and two other calves were placed in the pig-house to-

gether with fattening pigs, piglets, and some 10 sows. The pig herd had been run as a closed unit for almost two years until March 20 and 23, when two sows were brought to a boar center for service. One litter of piglets had died about April 15—16 with symptoms suggestive of Aujeszky's disease. The sow concerned had been taken to the veterinary hospital for Cesarean section. In fact she was being operated on on April 10 at 10 p.m., when the heifer from Outbreak 170 arrived, and the two animals were operated on in uninterrupted succession by Veterinarian A. The sow was delivered of 14 live piglets, four of which were placed with another sow on the farm on the following day. These four piglets survived.

Identification of isolates

One extra-neural isolate from each animal was examined in a neutralization test with rabbit immune serum. By comparing to normal rabbit serum a neutralization index of $\geq 10^5$ was demonstrated in all cases.

DISCUSSION AND CONCLUSIONS

Outbreak 181.

It was pointed out in preceding papers (*Bitsch 1975a, b*) that outbreaks in cattle with anterior pruritus — including cases with a thoracic cord involvement and pruritus of the chest or no pruritus — are most likely to have resulted from infection by the respiratory route.

The present outbreak fits in this pattern. The isolation of virus from lung tissue of Animal 5 is so far unique, but appears to be in accordance with the notion of a transient lung infection, the more so because in this case virus could not be demonstrated in the medulla oblongata.

The finding of virus at considerable titers in swabs from mucous membranes of Animal 6 must be taken as a proof of virus excretion, not least in view of the fact that the swabs were collected shortly after the death of the animal. But still there was no evidence of a transmission of the infection to other animals.

Outbreak 175.

It is obvious that the source of infection should be searched for outside the farm. The virus found in the anal swab probably originated from the vagina. But the virus is not likely to have

been transferred to the vagina during parturition, in that an incubation period of 11 days is not consistent with the accepted variation of four to nine days. But if on his visit the veterinarian had virus on his hands from an earlier visit to a pig herd, the vaginal exploration was just the procedure to bring about the vaginal infection noted; and the incubation period would be acceptable. In fact there seems to be no other possibility at all.

Outbreaks 170, 171 and 173.

Since during 1974 only 17 outbreaks of Auj. D. in cattle were diagnosed in Denmark, three outbreaks occurring practically at the same time in one veterinary practice must be suspected to be interrelated.

The animals from Outbreaks 170 and 171 are both likely to have received the infection from outside the farms concerned, since no direct or indirect contact with infected pigs on the premises was imaginable. There is obviously no other connecting link than Veterinarian A.

Most probably virus was introduced into the veterinary hospital by the sow from the farm where Outbreak 173 occurred. The sow is likely to have been in an early phase of the infection, having not yet developed antibodies, but being excreting enough virus to contaminate the hands of the operating surgeon. This is consistent with the fact that her piglets died a few days later except for the four ones that were placed with another sow, where they might well have received antibodies with the milk. In Outbreak 170 virus most probably entered through the surgical wound and in Outbreak 171 through the genital tract, with incubation periods of, respectively, five and six days. Presence of virus on the hands of Veterinarian A on April 11 could be due to his handling the piglets in the morning.

Thus the most important results of the investigations into the five outbreaks described are the demonstration of virus in lung tissue of one animal and excretion of virus from another, which further substantiates the notion of an infection by the respiratory route (Outbreak 181), and circumstantial evidence of an infection transmission by man in three outbreaks with posterior pruritus (Outbreaks 175, 170 and 171).

REFERENCES

- Bitsch, V.:* A study of outbreaks of Aujeszký's disease in cattle. I. Virological and epidemiological findings. *Acta vet. scand.* 1975a, 16, 420—433.
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SAMMENDRAG

Undersøgelser af udbrud af Aujeszký's sygdom hos kvæg.

III. Udvalgte udbrud af særlig interesse i epidemiologisk henseende.

Der beskrives fem udvalgte udbrud af Aujeszký's sygdom hos kvæg. I et udbrud, hvor kløe optrådte på forparten, påvistes virus i lungemateriale af eet dyr og i næsesekret af et andet, hvilket har yderligere sandsynliggjort, at lidelsen hos kvæg kan optræde primært som en luftvejsinfektion. I to af tre udbrud med epidemiologisk sammenhæng og i et fjerde udbrud, alle med eet angrebet dyr med kløe på bagparten, fandtes vægtig dokumentation for, at virus var blevet overført med mennesker.

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