

Stamp J T, McEwen A D, Watt J A A & Nisbet D I. Enzootic abortion in ewes. I. Transmission of the disease. *Vet. Rec.* 62:251-6, 1950.
[East of Scotland College of Agriculture, and Animal Diseases Research Association, Moredun Institute, Edinburgh, Scotland]

A disease of the foetal membranes of aborting sheep, caused by a psittacosis infective agent (*Chlamydia psittaci* var. *ovine*), is responsible for considerable economic loss worldwide. [The *SCJ*® indicates that this paper has been cited in over 160 publications since 1955.]

John T. Stamp
Vale Bank
48 Forth Street
North Berwick, EH39 4JQ
Scotland

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My own research on abortion in sheep began in 1944 after I was appointed chief veterinary investigation officer in the east of Scotland; I quickly realised that abortion was an important economic problem for the area sheep industry, the incidence often being as high as 30 percent in many flocks.

The first published description of the disease was by J.R. Greig,¹ who stated that its geographic distribution was growing, but it had been widely recognised in Scotland for at least 50 years prior to that and was known as "kebbing" by shepherds and flockmasters. Greig considered that a deficiency in the diet caused the disease, but his experimental data failed to confirm that deficiencies of phosphorus, vitamins A or E, or protein had any bearing on it. Greig named the condition enzootic abortion.

My field investigations detailing postmortem and histological examinations and especially the observation that immunity developed after abortion convinced me that the disease was infectious. Nevertheless, I was unable to find a causal bacterium despite many cultural examinations of the abomasal contents of lambs aborted late in pregnancy. The placental tissues obtained from the lambing sheds and fields were, of course, contaminated and were disposed of in the laboratory bucket!

J.A.A. Watt and I decided to carry out a small transmission experiment in which we injected ewes towards the end of their pregnancies with material from lambs aborted at Scottish border farms. The pregnant sheep that were injected came from farms considered free of abortion. These experimental

sheep were carefully looked after by an experienced and friendly shepherd, but he was so conscientious he could not bear to tell us that our sheep had aborted in considerable numbers and he buried the evidence! Although we made no progress in determining the cause of the abortions, it was clear that abortion did occur after our injections.

As a result, the following year the four of us, A.D. McEwen, Watt, D.I. Nisbet, and I, planned a large-scale transmission experiment using spleen, kidney, liver, lung, and stomach contents from 38 aborted foetuses (from which no bacteria could be cultured) obtained from farms with outbreaks of abortion. This material was stored at -70° C until March of the following year when we inoculated pregnant ewes with selected filtrates and suspensions. Pregnant ewes serving as controls were injected with saline serum broth. All the ewes were run together as a flock and this time they were observed day and night by veterinary students living in tents erected in the fields.

Abortions commenced in April and the foetuses and foetal membranes were collected by the students. The membranes, this time uncontaminated, were examined, and we found characteristic lesions that contained large numbers of small microorganisms that stained red when prepared with diluted Ziehl-Neelsen stain. These microorganisms were also quite evident when we used dark-ground illumination on the microscope. The organisms were later typed as belonging to the psittacosis lymphogranuloma group,² and a serological test (complement fixation) was developed for field diagnosis.³ The disease is now named chlamydial abortion and is widely disseminated in Europe, the USSR, the US, and Canada.

Commercial vaccines containing both the original isolate as well as current field strains are effective in reducing economic loss but do not eliminate the infection. Chlamydial infection is spread from farm to farm and within a flock by sheep carrying asymptomatic intestinal infections, by lambs infected at birth, and by contaminated lambing fields and pens. Sheep rarely abort twice, but they remain carriers and can infect healthy sheep.

Recently, male shepherds assisting with lambing in infected flocks have developed a febrile illness. Abortions followed by serious illness⁴ have also been recorded in pregnant women helping with lambing. Such illnesses have probably occurred for many years but were not diagnosed due to ignorance of the disease. (For a recent review of this subject, see reference 5.)

1. Greig J R. Enzootic abortion in ewes: a preliminary note. *Vet. Rec.* 48:1225-32, 1936.

2. Stamp J T. Developmental forms of the virus of ovine enzootic abortion. *J. Comp. Pathol.* 61:215-8, 1951.

3. Stamp J T, Watt J A A & Cockburn R B. Enzootic abortion in ewes: complement fixation test. *J. Comp. Pathol.* 62:93-101, 1952.

4. Ministry warns women of abortion risk. *Vet. Rec.* 120:2, 1987.

5. Aitken I. Chlamydial abortion in sheep. *In Practice* 8:236-7, 1986.