RESEARCH NOTE

BLUETONGUE VIRUS AS A CAUSE OF HYDRANENCEPHALY IN CATTLE

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ABSTRACT


The aim of this investigation was to determine the effect of an attenuated bluetongue virus on the bovine foetus.

INTRODUCTION

Hydranencephaly is relatively rare in cattle, but during 1973 a number of cases in new-born calves came to our notice. Although the condition had not previously been reproduced experimentally, bluetongue virus was incriminated in an outbreak of bovine hydranencephaly in California (McKercher, Saito & Singh, 1970), and it was also isolated from other natural cases in the U.S.A. (Luedke, Jochim, Bowne & Jones, 1970).

The only virus that could be isolated with the techniques applied was Type 10 bluetongue virus. This was obtained from the lungs of the calf, which also had a complement-fixing antibody titre of 1:16 against bluetongue virus. It was not possible to demonstrate specific antibodies in the foetus.

DISCUSSION

No teratological abnormalities were mentioned in the detailed description of bluetongue in cattle in South Africa given by Bekker, De Kock & Quinnan (1934), but, in a recent discussion of hydranencephaly in the USA, bow-leggedness and jaw malformations were described (McKercher et al., 1970).

The question arises whether similar conditions do indeed occur in South Africa or whether they have hitherto been overlooked. The abnormal “dome-shaped” head which was found in the aborted foetus of the first experimentally-produced case could possibly be overlooked in extensive husbandry since...
aborted foetuses are rarely found. The calf had a normal appearance but could hardly walk owing to severe incoordination and weakness. Under field conditions such calves are often killed off without the aetiology being determined. A large percentage of the natural cases of hydranencephaly brought to our notice occurred in a herd in which prenatal losses had received special attention. The majority of these calves and foetuses appeared normal outwardly, and so it is quite possible that hydranencephaly, resulting from bluetongue virus, occurs more generally than is realised. The fact that hydranencephaly can be induced experimentally with attenuated virus and that similar cases were observed under normal husbandry conditions are positive indications that bluetongue virus must be incriminated as a possible cause of abortion and neonatal deaths in cattle.

The immunological competence of a foetus is dependent on the age of the foetus and the nature of the relevant antigen (Silverstein, Uhr, Kraner & Lukes, 1963). In the case of bluetongue virus, the foetal calf is reported to become immunologically competent at approximately 150 days' pregnancy and that infections before that time apparently result in tolerance (Jochim, Luedke & Chow, 1974). In this investigation, however, the calf that was infected on Day 138 did develop antibodies. Since the calf remained infected until after birth, it is clear that antibodies could have developed at any stage after infection, but the development of such antibodies, in spite of the early infection, is an indication that more factors than just the antigen and the period of infection play a role in the development of tolerance.

REFERENCES


FIG. 1 The foetus shows a marked enlargement of the cranium
FIG. 2 Appearance of the foetal brain after removal of the dorsal wall of the cranium
FIG. 3 The cerebral hemispheres are completely replaced by a straw-coloured fluid
FIG. 4 The foetal brain after removal of the straw-coloured fluid
FIG. 5 The calf's brain on the left compared with a normal brain
FIG. 6 The greater part of both cerebral hemispheres of the calf's brain is replaced by large cyst-like cavities filled with a straw-coloured fluid