Epizootiological behaviour
of the Middle-East strain (A22)
of aphthovirus at a pig breeding farm

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Summary: Observations have been recorded on the epidemiological behaviour of the Middle-East strain (subtype A22) of aphthovirus at a pig breeding farm in Uttar Pradesh, India.

The A22 outbreak was briefer and had much higher attack rate and case fatality rate for adult pigs than in outbreaks of serotypes O and Asia 1 infections at the same pig breeding farm.

Among various strains of aphthovirus (foot and mouth disease virus), the subtype A22 (Middle-East strain) is of considerable importance; the extent of its immunological difference from earlier type A strains, the wide geographical area of its spread, and its emergence as the main endemic strain in many of the countries affected, are some of the characteristics which single out A22 from other new variants of the virus (Arrowsmith, 1975). The precise date of entry of this strain into India is not known, but during 1967-68 it was associated with a large number of outbreaks in many States of the country.

Although of considerable epidemiological significance, very little seems to have been published on the morbidity and mortality associated with this Middle-East strain in different species of livestock. This paper reports on the epidemiological behaviour of strain A22 of aphthovirus among pigs in comparison with that of other serotypes of the virus at the same pig breeding station in Uttar Pradesh, India.

MATERIALS AND METHODS

The Regional Pig Breeding Station, Aligarh, which is the subject of this study, is one of the oldest piggeries in Uttar Pradesh. This breeding station maintains a stock of imported pigs (Large White Yorkshire, Middle White Yorkshire, Charmukha and Tamworth) to meet the requirement of boars for upgrading the indigenous stock of the State. Data on morbidity and mortality were collected at the time of each outbreak. Vesicular material from clinical cases and pieces of myocardium from dead pigs were collected and preserved in buffered glycerine for the study. The aphthovirus was isolated in unwean-

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RESULTS AND DISCUSSION

It has been very difficult to calculate the true incidence of foot and mouth disease (FMD) in countries where a slaughter policy is followed, because slaughtering of all the sick and healthy in-contact pigs prevents complete expression of the infection in a herd. However, in an endemic country like India, the absence of stamping-out policy makes it possible to follow the dynamics of the disease and to assess its incidence to the fullest extent in a herd.

During the last ten years (1971-81), the Regional Pig Breeding Station suffered 4 outbreaks of FMD; the first two of these were attributed to type O aphthovirus. The third outbreak was assigned to type Asia 1, whereas an exotic strain (A22) of the virus was responsible for the latest (1981) outbreak of the disease. The overall morbidity for these outbreaks appeared to vary with the serotype of the virus; the highest (51%) being associated with type O and the lowest (28%) with Asia 1 virus (see Table I). Among the typed outbreaks, Kalra et al. (1971) also observed lowest morbidity with type Asia 1 virus at a pig breeding unit in the State of Punjab in India.

The age distribution of the disease also differed with strains of virus. While serotype O (1976) and Asia 1 outbreaks did not show any age predilection, the age-specific attack rates showed marked (P > 0.001) dominance in young pigs (under 6 months of age) with serotype O (1978) and in adults with A22 strain.

In all the outbreaks studied, the case fatality was significantly (P > 0.001) higher for young pigs than for adult animals. However, with A22 virus, an unusually high (10.8%) case fatality rate was reported in adult animals too; this does not include the 26.6% of adult cases which took 2-3 months to die of secondary complications (lingering mortality). All these cases had severe podal lesions which became necrotic and gangrenous, leading to systemic complications including purulent pneumonia.

The high morbidity and mortality in adult pigs recorded with A22 virus strain is contrary to the observations of Gupta et al. (1962), Kalra et al. (1971) and Singh and Murty (1972). However, such an epidemiological anomaly is not unexpected when a virus strain, immunobiologically different from those prevalent earlier, strikes an animal population (Boiko and Shulyak, 1974).

Another interesting epidemiological feature of the A22 outbreak was its comparatively shorter course; in spite of the larger number of animals exposed during the A22 outbreak, it took only 23 days to reach its clinical endpoint as compared to 28 to 42 days for other serotypes of the virus at the same breeding unit. Shorter duration of epidemics of A22 virus infection has
TABLE I
Incidence of foot and mouth disease in pigs
at the Regional Breeding Station, Central Dairy Farm, Aligarh, India

<table>
<thead>
<tr>
<th>Year</th>
<th>Below 6 months</th>
<th>Adults</th>
<th>Virus type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At risk</td>
<td>Affected</td>
<td>Attack rate (%)</td>
</tr>
<tr>
<td>1976</td>
<td>338</td>
<td>151</td>
<td>44.7</td>
</tr>
<tr>
<td>1978</td>
<td>321</td>
<td>190</td>
<td>59.2</td>
</tr>
<tr>
<td>1980</td>
<td>300</td>
<td>88</td>
<td>29.3</td>
</tr>
<tr>
<td>1981</td>
<td>445</td>
<td>106</td>
<td>23.8</td>
</tr>
</tbody>
</table>

* CFR : Case fatality rate.
FIG. 1
Number of cases by week in different FMD outbreaks at the Pig Breeding Station, Aligarh, U.P.
also been recorded by Dubrovin and Poluliakh (1973) in the Ukraine, U.S.S.R.

Analysis of the epidemic curve plotted for different outbreaks indicates a pattern more or less similar to that of a point-epidemic (see Figure 1), where cases of the disease tend to cluster in time. In the type O (1978) outbreak, the first week alone contributed towards 49% of the total morbidity. By contrast, 57% of the total cases in the type Asia 1 outbreak occurred during the 5th week, while 39% of cases in the A22 outbreak occurred during the 2nd week. Such explosive flare-ups of FMD in pigs may be due partly to the peculiarity of aphthovirus excretion in this species. Pigs are reported to be strong excretors of virus; one pig can liberate up to 10^8 ID_{50} of airborne virus a day, which is 30 to 2000 times higher than in cattle and sheep (Donaldson et al., 1982; Gloster et al., 1982). Thus a single infected pig could be a potential hazard to a number of animals in a herd.

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REFERENCES


