EFFICACY OF DIFFERENT ADJUVANTS TO POTENTIATE THE IMMUNE RESPONSE TO MYCOPLASMA STRAIN F-38

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SUMMARY

A study was carried out to determine the efficacy of different adjuvants in enhancing antibody response to sonicated F-38 antigens. Goats were immunised against CCPP using antigens incorporated in Freund's incomplete adjuvant (IFA), saponin, aluminium hydroxide gel and buffered saline (PBS) respectively. Antibody responses were determined. The goats were challenged four months after immunisation to assess their immune status. Two of eight goats given antigen in PBS, six of 10 goats given antigen in aluminium hydroxide, seven of eight goats given antigen in IFA and all 10 goats given antigen in saponin withstood the challenge. Saponin and IFA were similar in their immune potentiation ability and were superior to aluminium hydroxide. As IFA has been considered unsuitable for use in food animals saponin may prove valuable in vaccination of goats against CCPP caused by mycoplasma strain F-38.

INTRODUCTION

Contagious caprine pleuropneumonia (CCPP) caused by Mycoplasma strain F-38 is an important disease of goats. F-38 was reported to be the cause of acute CCPP in Kenya (MacOwan and Minette, 1976). Since then it has been reported to occur in Sudan (Harbi, El Tahir, MacOwan and Nayil, 1981) and in Tunisia. It has been demonstrated that sonicated F-38 antigens incorporated in complete Freund's adjuvant induced an antibody response and rendered immunised goats resistant to in-contact challenge (Rurangirwa, Masiga and Muthomi, 1981a). Further studies using the sonicated antigens in IFA and in aluminium hydroxide gel (algel) revealed that the antigens incorporated in IFA conferred better protective immunity (Rurangirwa, Masiga and Muthomi, 1984). As oil adjuvants are not suitable for use in food animals, the search for alternative adjuvants has continued. This communication reports the results of a study that compared the immune potentiation ability of saponin and algel incorporated in sonicated F-38 antigens.

MATERIALS AND METHODS

Experimental animals were goats aged between nine and 12 months. The goats were serologically negative to F-38 antigens before the start of the experiment.

F-38 antigens were prepared as previously described (Rurangirwa et al., 1981a) and the protein content of the sonicated antigens was determined by the method of Watters (1978). The antigens were adjusted and used at a concentration of 5 mg of protein per dose. Saponin (Riedel-de haen ag Seelze, Hanover),
TABLE I

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of goats</th>
<th>Immunisation with</th>
<th>Concentration of protein per dose (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>Antigen + saponin</td>
<td>5-0</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>Antigen + Al(OH)₃</td>
<td>5-0</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>Antigen + IFA</td>
<td>5-0</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>Antigen + PBS</td>
<td>5-0</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Aluminium hydroxide and saponin were used at concentrations of 10 mg and 3 mg per dose respectively.

IFA (Difco), algel (Wellcome Laboratory, Kabete, Kenya) were incorporated in the antigens. Saponin and algel were used at concentrations of 3 mg and 10 mg per dose respectively.

A total of 50 goats were randomly divided into five groups of 10 goats each. Each goat was injected subcutaneously with 1 ml of antigen preparation (Table I). One group served as the unvaccinated control group. The same doses were repeated once three weeks later. The goats were left to browse freely during the day and housed at night with plenty of water and hay.

All the goats were bled before the primary vaccination and thereafter weekly. Serum was separated and kept at -20°C until tested for antibodies against F-38 antigens. The antibody response was monitored by the indirect haemagglutination test (IHA) (Rurangirwa, Masiga, Muriu, Muthomi, Mulira, Kagumba and Nandokha, 1981b). Four months after vaccination the 40 vaccinated goats and the 10 controls were exposed to 10 goats artificially infected by endobronchial intubation with Mycoplasma strain F-38. All the goats were clinically examined daily and rectal temperatures charted. The experiment was terminated two months after all control goats had died. All the surviving goats were then slaughtered and examined for CCPP lesions.

Post-mortem examination was done on all goats that died during the challenge and those that were slaughtered. Pathological lesions were recorded. The isolation of mycoplasmas was done using the method of Davies, Masiga, Shifrine and Read (1968). Confirmation of the isolation of Mycoplasma strain F-38 was by the growth inhibition test (Davies and Read, 1968).

RESULTS

The first dose of antigen induced low antibody responses (Fig. 1). Following the second antigen dose high antibody titres were detected in the groups of goats immunised with antigen incorporated in saponin and in IFA.

The goats inoculated endobronchially with Mycoplasma strain F-38 developed pyrexia of 40°C and above six days after inoculation and all died 5-2 ± 1-4 days later. The control goats developed fever 10-1 ± 2-7 days after exposure to the infected goats. All died 6-8 ± 1-6 days later (Table II). Four goats, two from the group immunised with antigen in PBS and another two from the IFA group, had died of peritonitis and injury before commencement of the challenge. Of the eight goats that remained in the group given antigen in PBS six developed fever 18-6 ± 3-0 days after exposure to the challenge; they died 8-7 ± 1-0 days later.