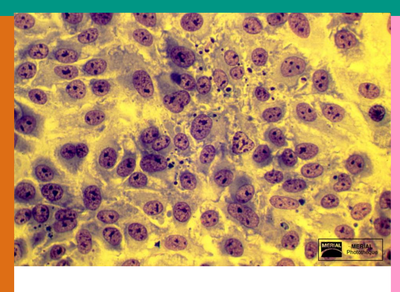

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Assessment of different "Peste des Petits Ruminants" challenge models in Goats

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INTRODUCTION

Peste des petits ruminants (PPR), is an OIE-listed, acute contagious disease caused by a Morbillivirus, affecting mainly sheep and goats and occasionally wild small ruminants. PPR was first identified in West Africa, in the 1940's and has progressively spread to East Africa, most of the Middle East, and parts of Asia including much of the Indian subcontinent.
The clinical disease is usually acute and characterized by pyrexia, ocular and nasal discharges, erosive lesions of mucous membranes particularly in the mouth, diarrhea and pneumonia. While the disease is frequently dramatic in endemic countries, experimental inoculation in controlled conditions does not always allow reproduction of the disease. Hereafter we report the assessment of 4 different conditions of experimental PPR virus challenges in goats.

MATERIAL & METHODS

Animals
Sixteen, PPR-naive, 10-months-old female goats were allocated to 4 groups, balanced for weights. Two groups (G1, G2) were housed separately in a high containment facility, while the 2 other groups (G3, G4) were housed similarly, in another high containment unit.

Challenge
2 different isolates, one from Ivory Coast 1989 (CI89) and the other from Morocco 2008 (MA08) were multiplied in cell culture and freeze-dried. Each freeze-dried isolate was then resuspended in DMEM to a concentration of 5.000 $TCID_{50}$/mL.
Goats were then inoculated on D0 as follows:

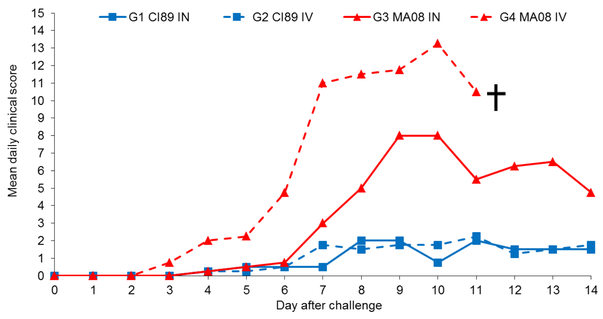
G1: CI89; 2 mL Intra Nasal (IN; 1 mL per nostril, with spray nozzle)
G2: CI89; 2 mL Intravenous (IV)

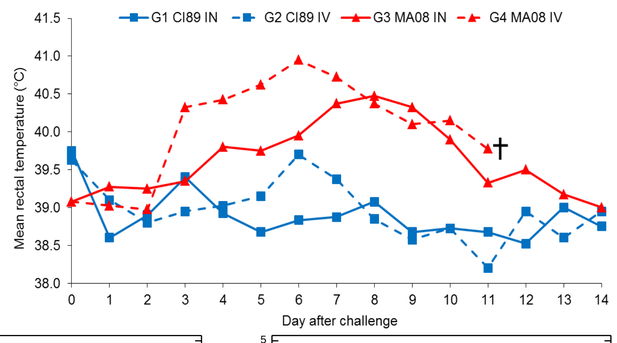
G3: MA08; 2 mL Intra Nasal (IN; 1 mL per nostril, with spray nozzle)
G4: MA08; 2 mL Intravenous (IV)

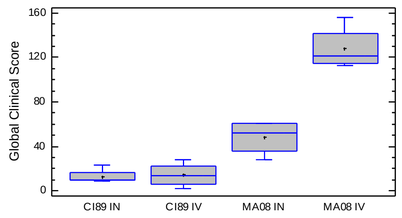
Monitoring
Daily, from D0 to D14, all animals were monitored for clinical signs and rectal temperatures, and were sampled for assessment of viraemia (EDTA blood samples) and viral excretion (ocular swabs) by qRT-PCR. Serum samples were taken at regular time points to assess seroconversion.
Weights were recorded before challenge and at the end of the study

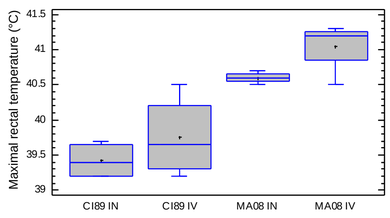
RESULTS

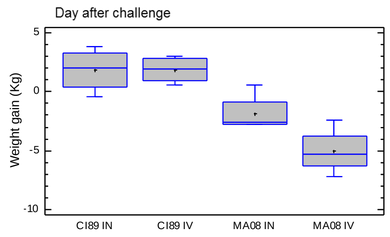
Clinical signs and scores
With the CI89 isolate, clinical signs were very mild, whatever the inoculation route. Conversely signs were marked (IN route) or severe (IV route) with the MA08 isolate. All goats from G4 were anticipatively euthanized on ethical ground. Signs comprised, hyperthermia, profuse nasal and ocular discharge, mucosal erosions, dyspnea, necrohemorrhagic diarrhea, mucosal erosions, polyadenitis and weight loss.



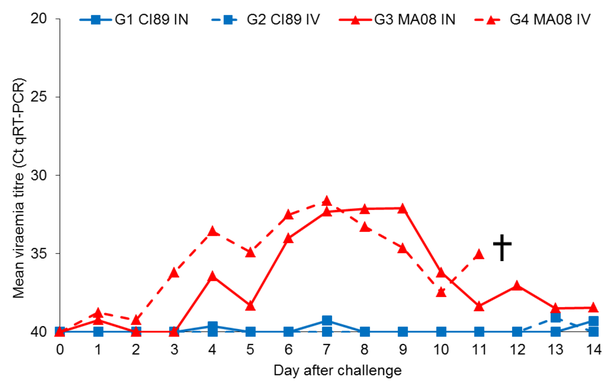


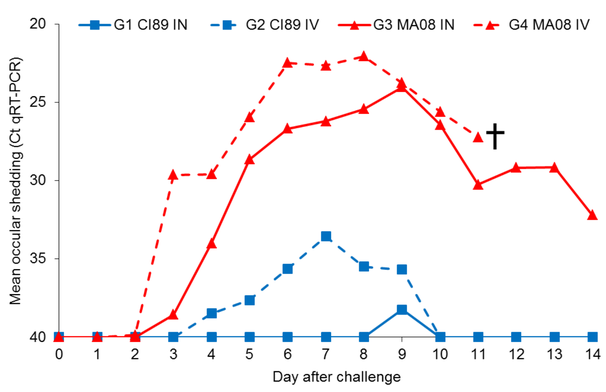




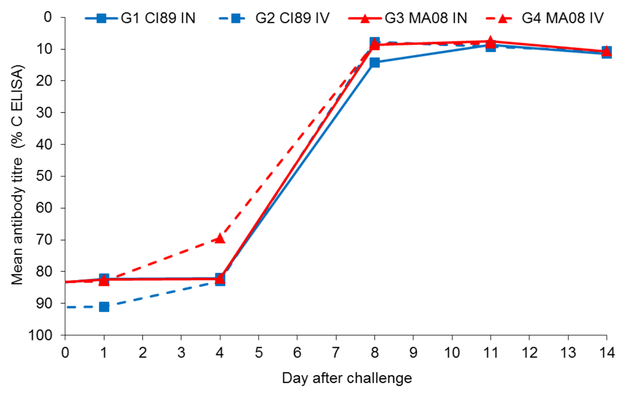


Viraemia & ocular shedding
Virus titers were much higher (lower Ct) in ocular swabs than in blood samples, whatever the group. MA08 was detected at much higher titers (whatever the route) and intravenous route was more efficient (whatever the isolate).





Serology
All animals in all groups seroconverted within 8 days after challenge.



CONCLUSIONS

These results show that, in the condition of the study, the CI89 strain induces mild clinical signs. Conversely, MA08 was able to induce moderate (IN route) to severe (IV route) clinical signs. The IV route of inoculation increased the level of both the clinical and virological parameters, whatever the challenge strain.
Overall the results showed that the MA08 is more virulent than CI89, both clinically and virologically in European Saanen goats.
The MA08 strain therefore appears appropriate for the evaluation of efficacy of vaccines.

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