COLOSTRAL ANTIBODIES AGAINST FOOT AND MOUTH DISEASE VIRUS TYPES IN CROSSBRED COWS

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The purified colostral immunoglobulins from just after parturition to 72 hours (at 12 hours interval) were processed for the titration of antibodies against foot and mouth disease virus types Asia-I, A and O. Geomean titres against Asia-I were 119.2, 51.98, 25.99, 7.99, 4.92, 1.62 and 1.23, respectively. For type A, geomean titres were 39.39, 27.85, 10.55, 7.99, 7.99, 1.41 and 1.23, respectively. For type O, geomean titres were 27.85, 6.49, 6.46, 3.99, 1.74, 1.23 and 1.23, respectively. Antibody titres against Asia-I were higher than those for A and O. Biological half- lives of colostral antibodies to virus types Asia-I, A and O were 10, 14 and 17 hours respectively.

INTRODUCTION

Colostrum provides serum immunoglobulins and may saturate the macromolecular transport system of the intestine to provide mechanical protection against invading organisms (Blood *et al.*, 1981). In a number of viral diseases, colostral antibodies have been shown to be of great importance in preventing early infections. There are strong indications that these antibodies limit the replication of foot and mouth disease (FMD) virus (Donaldson, 1979). The significance of colostral immunity has been consistently emphasised. The present project assesses the colostral antibodies against FMD type Asia-I, A, and O virus in crossbred cows.

MATERIALS AND METHODS

Purification of colostral immunoglobulins: Ten crossbred cows in late pregnancy were selected at random from the University Livestock Farm which receive yearly vaccination with polyvalent FMD vaccine (types Asia-I, A and O). From each cow, seven colostrum samples were collected at 12-hour intervals up to 72 hours and processed for the purification of immunoglobulins according to Akhtar *et al.* (1992).

Indirect Haemagglutination Test

Antigen: The cell culture fluid of FMD virus types Asia-I, A and O were obtained from the Veterinary Research Institute, Lahore. The fluid was centrifuged at 5,000 rpm for 15 minutes to settle the extra-cellular components. The supernatant was subjected to ultra-centrifugation at 20,000 rpm for 30 minutes to pellet the virus (courtesy of Nuclear Institute for Agriculture and Biology, Faisalabad). The pellet was then reconstituted with phosphate buffered saline (PBS) solution. The virus suspension subjected to sonification for 2 x 3 minutes was used as antigen.

Indirect haemagglutination (IHA) test was performed to assess the antibody titres against FMD virus types Asia-I, A and O. Sheep erythrocytes were sensitized with gluteraldehyde and antigen (Tokuda and Warrington, 1970). The sensitized ery-

throcytes were finally resuspended in PBS to make 1.5% suspension.

A two-fold dilution of the colostral immunoglobulins was made with PBS. Equal volume (0.05 ml) of sensitized erythrocytes (1.5%) was added in each well of the microtitration plates. The plates were tapped to ensure even mixing of erythrocytes and kept at 37°C for 2 hours. The degree of haemagglutination in each well was recorded in comparison with the positive and negative control. Geomean titre (GMT) and biological half-life of colostral antibodies to FMD virus types were calculated according to Paul *et al.* (1982).

calves, born from dams vaccinated against FMD, through colostrum only (Khukhorov *et al.*, 1978). In the present studies, the purified colostral immunoglobulins from just after parturition to 72 hours (at 12 hour intervals) were processed for the titration of antibodies against FMD virus types Asia-I, A and O. For Asia-I, IHA titre at 0, 12, 24, 36, 48, 60 and 72 hours interval after parturition ranged from 1:8 to 1:512 (GMT = 119.2), 1:32 to 1:512 (GMT = 51.98), 1:32 to 1:128 (GMT = 25.99), 1:4 to 1:128 (GMT = 7.99), 1:4 to 1:32 (GMT = 4.92), 1:4 to 1:8 (GMT = 1.62) and 0 to 1:8 (GMT = 1.23), respectively.

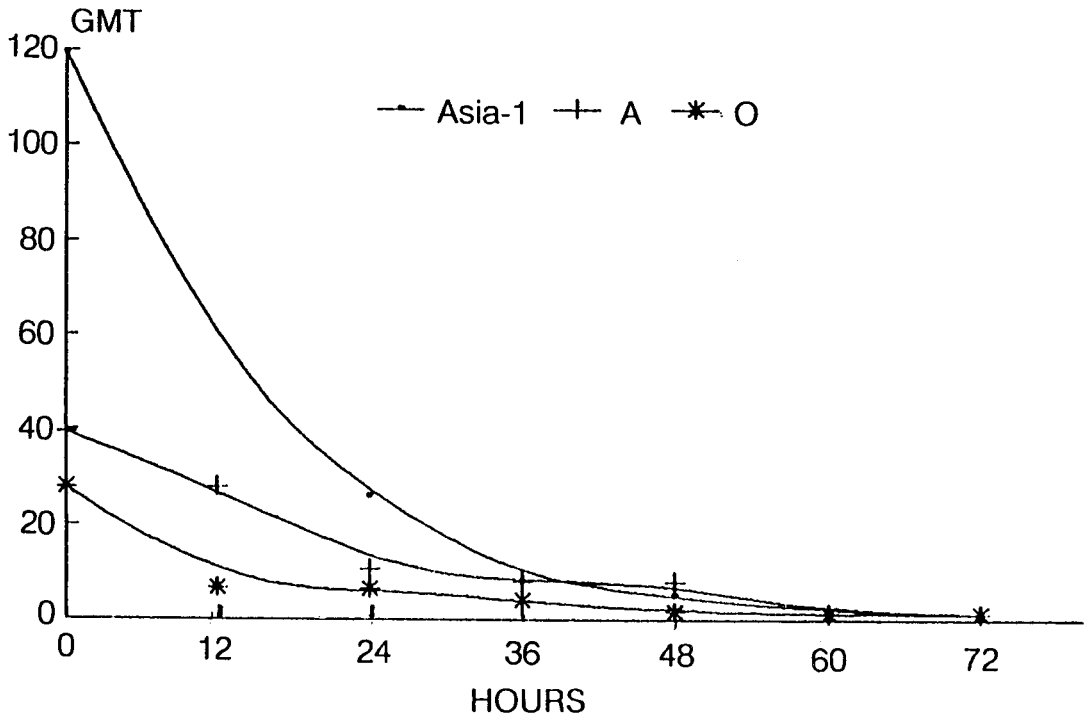

Fig. 1. Geomean of immunoglobulins against FMD virus types in the colostrum of 10 crossbred cows

RESULTS AND DISCUSSION

Previous studies have shown that the neutralizing antibodies are transferred to

For type A, IHA titre at 0, 12, 24, 36, 48, 60 and 72 hours interval ranged from 1:8 to 1:512 (GMT = 39.39), 1:32 to 1:512 (GMT = 27.85), 1:32 to 1:128 (GMT =

10.55), 1:4 to 128 (GMT = 7.99), 1:8 to 1:256 (GMT = 7.99), 1:4 to 1:8 (GMT = 1.41) and 0 to 1:8 (GMT = 1.23), respectively. For type O, IHA titre at 0, 12, 24, 36, 48, 60, and 72 hours interval ranged from 1:2 to 1:128 (GMT = 27.85), 1:2 to 1:64 (6.49), 1:2 to 1:32 (GMT = 6.46), 1:2 to 1:16 (GMT = 3.99), 1:2 to 1:8 (GMT = 1.74), 0 to 1:2 (GMT = 1.23) and 0 to 1:2 (GMT = 1.23), respectively.

There is a significant but negative correlation between time intervals and geomean IHA antibody titres against FMD type Asia-I ($r = -0.6148$, $P<0.001$), A ($r = -0.7693$, $P<0.001$) and O ($r = -0.7045$, $P<0.001$).

The results clearly indicated that with the passage of time, after parturition, IHA antibody titre decreased (Fig. 1). Similar results were also obtained by Shankar and Uppal (1981) who demonstrated that the antibody titres to FMD virus increased rapidly within 24 hours of feeding colostrum to calves and then decreased with age after parturition. Although, IHA antibody titre against type Asia-I is remarkably higher than types A and O. This may be due to the reason that either the type Asia-I component of vaccine is greater or due to the exposure of dams to type Asia-I field virus. It also indicated that a substantial amount of immunoglobulins against FMD virus is available in the colostrum during first 24 hours after parturition. These findings are in accordance with Outteridge (1985). Later it is in negligible amount i.e. upto 72 hours. It could be concluded that the colostrum should be fed to calves particularly upto 24 hours so that maximum amount of colostral immunoglobulins are ingested by the calf to combat infection upto four months postpartum, i.e. before active immunization against FMD. The rate of decline of immunoglobulins in colostrum is related with the biological half-life of 10 hours for type Asia-I, 14 hours for A and 17 hours for O.

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