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Antibody response against three serotypes (O, A & ASIA1) of FMD virus in Andhra Pradesh during the year 2025

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Abstract

Foot and Mouth disease (FMD) is the most significant animal viral disease in India in terms of economic losses and trade involved. Effective vaccination and comprehensive vaccination coverage have led to reduction in FMD incidences. The antibody responses against three serotypes of FMD Virus during 2025 were studied by conducting sero monitoring studies (SPCE) in pre and post sera samples collected in selected villages in different districts of Andhra Pradesh. We have achieved 40% of pre vaccination sero conversion percentage and 70% of post vaccination antibody response during 2025. If vaccination campaigns continue in a timely manner with high density using good quality vaccine the herd immunity may increase further reaching up to 90% which will act as a shield for restriction of virus transmission.

Keywords: NI FMD, Bhubaneswar, FMD, Herd immunity, vaccination, antibody, monitoring

Introduction

Foot and Mouth Disease (FMD) is a highly contagious viral infection that can have serious socioeconomic consequences wherever it is found. FMD is a significant livestock disease in India, with three of the seven FMD virus serotypes (O, A, and ASIA1) being prevalent. The FMD virus is transmitted via direct contact with infected animals or indirect contact with secretions or excretions (including semen and milk) from infected animals or by mechanical vectors (people, horses, dogs, cats, birds, vehicles) or air movement over land or water. FMD virus is shed into milk in dairy cows before clinical signs develop, so there is opportunity for virus to spread from farm to farm and from cow to calf via raw milk (OIE, 2012) [3]. FMD virus may survive pasteurization depending on the method (high temperature short time, ultra high temperature, laboratory pasteurization); the lipid component of milk protects virus during heating.

FMD is characterized by fever and vesicles in the mouth and on the muzzle, teats, and feet of animals and is spread through contact with infected animals or their excretions. The virus can also be transmitted as an aerosol via respiratory secretions and through milk, semen, and ingestion of feed from infected animals (meat and offal). In a susceptible population, morbidity can reach 100% but with rare fatalities except in young animals. The carrier state can last for up to 3.5 years in cattle, 9 months in sheep. After infection with FMD virus, the average incubation period for sheep and goats is 3-8 days, ≥ 2 days for pigs, and 2-14 days in cattle. It is important to be aware that animals can transmit the virus before the appearance of clinical signs because animals have virus in the pharynx and in the blood before disease is observed.

The most important requirements in the fight against FMD are vaccination, along with zoo-sanitary measures and restrictions on animal mobility. Since 2004, the government-sponsored vaccination-based FMD control programme, beginning with 54 districts in 2004 and gradually expanded to cover the entire country in 2018-19.

Post-Vaccination Monitoring (PVM) is required for countries pursuing a vaccine-based FMD control policy to assess the effectiveness of vaccination regimens and programmes. It is also an important component of the FMD surveillance programme.

Furthermore, countries seeking official certification by the World Organization for Animal Health (WOAH) of supported national control programmes or national or zonal FMD vaccination freedom must conduct post-vaccination sero-monitoring. Because a variety of factors can influence the efficacy of FMD vaccination, the programmes must be carefully monitored to identify flaws and ensure long-term disease control.

Materials and Methods

The sampling plan for the sero-monitoring studies by following recommendations provided in the WOAH & FAO FMD vaccination and sero-monitoring guidelines was communicated by the NIVEDI, Bengaluru only. Therefore, sampling at two different points in time (0days, i.e., at the time of vaccination) and again after 21days post-vaccination to assess the changes in population immunity at the animal at different age groups. During the year 2025 a total of 1100 pre and 1100 post sera samples were collected by following strict sample collection regimen and tested at FMD Collaborating centre, Vijayawada under technical and financial support from National institute on FMD (NI FMD), Bhubaneswar, Odisha state. The reagents and kits required for conducting the sero monitoring studied to know the antibody response against three serotypes of FMD Virus were supplied by the NI FMD, Bhubaneswar.

Results

The antibody titres were expressed as 50% end point titre i.e. the reciprocal $\log_{10}$ dilution at which the wells with test sera showed 50% inhibition with respect to antigen control wells was considered to be the titter of the serum. The serum samples which had antibody titres of greater than or equal to $1.8 \log_{10}$ were considered to have protective immune response against FMD virus infection.

The antibody response against three serotypes of FMD in Andhra Pradesh during the year 2025 was obtained by employing the Solid Phase Competitive ELISA (SPCE) developed and standardised by the NI FMD, Bhubaneswar to test the sera samples. The results are as follows.

The percent of animals demonstrating protective antibody titres (greater than or equal to $1.8 \log_{10}$) against FMDV serotypes O, A and Asia1 were 40.5, 35.1 and 36.6 in pre vaccinated sera samples and 69.0, 65.8 and 71.3 in post-vaccinated sera samples respectively.

The Vizianagaram, West Godavari, Kurnool, Kadapa, Anantapur and Chittoor got pre vaccination sero conversion above 40%. Some districts like Krishna, Prakasam and Nellore got less than 20% pre vaccination sero conversion percentages. Remaining districts have pre vaccination percentages between 20-40%. Regarding post vaccination sero conversion percentages East Godavari, Kurnool, Kadapa, Anantapur and Chittoor districts showed encouraging results like more than 74% of positive antibody response on post sera samples. In districts like Prakasam and Nellore showed less than 50% of sero conversion in post-sera samples. Remaining districts achieved the antibody responses percentages between 50-74%. The animals exhibit different antibody responses against three serotypes of FMDV i.e. O, A and Asia1 irrespective of same dose of vaccine to all the susceptible Bovine population.

Discussion

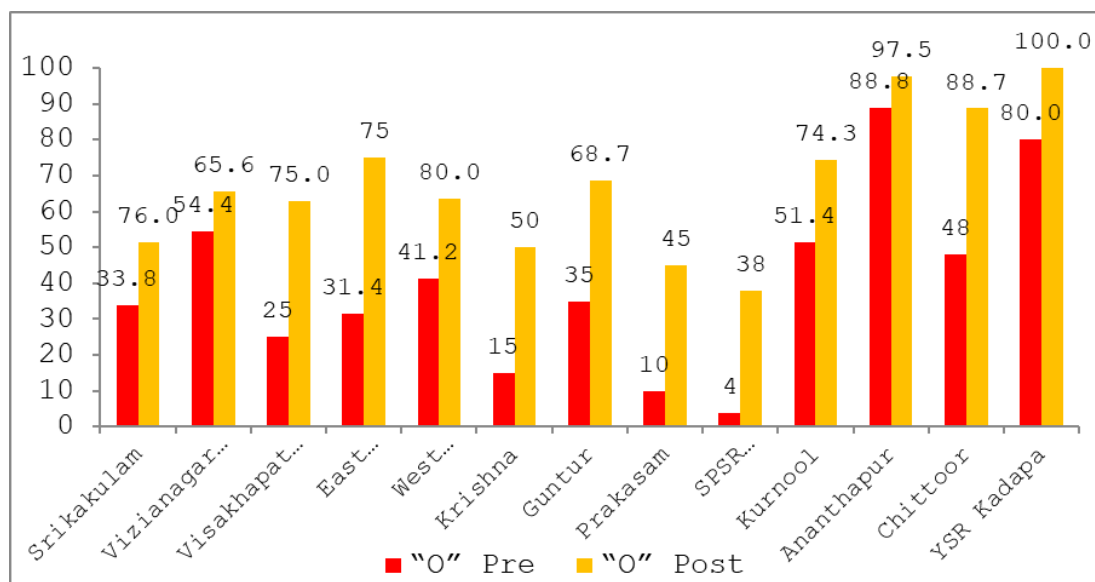
In the process of achieving disease free status with vaccination and to progress to the next stages of the Progressive Control Pathway, we should have proper pre and post vaccination sero-monitoring in place. The pre and post-vaccination sero monitoring was designed to evaluate the effectiveness of the vaccination program and eventually assessment of the immunity status of the livestock to combat the disease incidence.

It was observed that in pre vaccination sera samples East Godavari, Nellore, Visakhapatnam, Prakasam, Krishna, Srikakulam and Guntur showed antibody responses IIN terms of Sero conversion percentages below 40%. It may be due to among 10 animals selected for sera samples collection 50% of animals i.e. 5 samples should be collected from the age group 6-12 months in which most of the animals are unvaccinated.

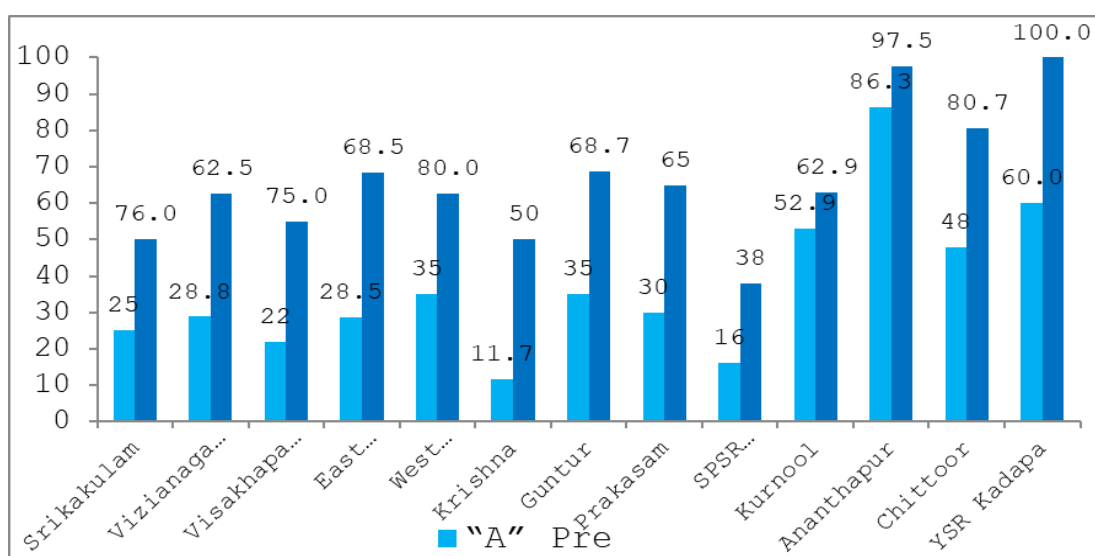
It was found that post vaccination sero conversion percentages of East Godavari, Kurnool, Kadapa, Anantapur and Chittoor districts showed more than 74% of positive antibody response on post sera samples which indirectly gives an indication that herd immunity is gradually developed among the livestock population so that in outbreak scenarios, the severity of the disease has decreased significantly. Srikakulam, Vizianagaram, Visakhapatnam, West Godavari, Prakasam, Nellore and Krishna showed post vaccination sero conversion percentages below 70% which indirectly warns that proper monitoring of vaccination, cold chain maintenance and check for proper dosage is required in these districts.

Table 1: Abstract of District-wise antibody response against three serotypes of FMD Virus during the year 2025

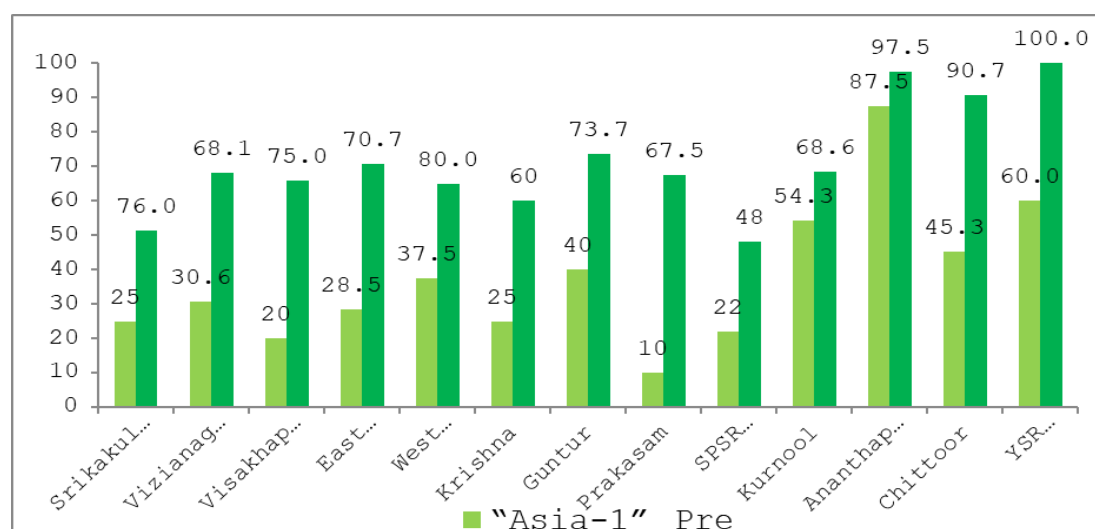
S. No.	District	Percent animals showing titres $\geq 1.65 \log_{10}$ against FMDV					
		“O”		“A”		“Asia-1”	
		Pre	Post	Pre	Post	Pre	Post
1	Srikakulam	33.8	51.3	25.0	50.0	25.0	51.3
2	Vizianagaram	54.4	65.6	28.8	62.5	30.6	68.1
3	Visakhapatnam	25.0	63.0	22.0	55.0	20.0	66.0
4	East Godavari	31.4	75.0	28.5	68.5	28.5	70.7
5	West Godavari	41.2	63.7	35.0	62.5	37.5	65.0
6	Krishna	15.0	50.0	11.7	50.0	25.0	60.0
7	Guntur	35.0	68.7	35.0	68.7	40.0	73.7
8	Prakasam	10.0	45.0	30.0	65.0	10.0	67.5
9	SPSR Nellore	4.0	38.0	16.0	38.0	22.0	48.0
10	Kurnool	51.4	74.3	52.9	62.9	54.3	68.6
11	Ananthapur	88.8	97.5	86.3	97.5	87.5	97.5
12	Chittoor	48.0	88.7	48.0	80.7	45.3	90.7
13	YSR Kadapa	80.0	100.0	60.0	100.0	60.0	100.0
Average		40.5	69.0	35.1	65.8	36.6	71.3



Graph 1: Graph showing percentage animals showing antibody response against Serotype "O" of FMD virus during the year 2025



Graph 2: Graph showing percentage animals showing antibody response against Serotype "A" of FMD virus during the year 2025



Graph 3: Graph showing percentage animals showing antibody response against Serotype "Asia 1" of FMD virus during the year 2025

Higher percent of animals demonstrating protective antibody titres during post vaccination indicated that the vaccination resulted in boosting up of immune response of animals against three FMDV serotypes i.e. O, A and Asia1. These

findings are in agreement with the observations recorded by Ansul, *et al.* (2015) [5].

It was concluded that effective and timely vaccination with proper dosage following complete cold chain, good

vaccination coverage (95% or more), prompt disease reporting plays crucial role in elevated antibody responses against three serotypes of FMD virus (RP Singh, 2025) ^[1].

The vaccine effectiveness can be assessed directly by observing the declining trend of FMD outbreaks and reduced severity in affected animals; and indirectly by Sero monitoring of sera samples collected before and after vaccination which indicates level of sero-conversion and proportion of animals protected. This is an important indicator of herd immunity. When proportions of protected animals reach a critical level (Approx 80%) then herd immunity is achieved and new introduction of virus will not result in an outbreak of disease (Anderson, 1985) ^[4].

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Conflict of Interest

Not available

Financial Support

Not available

Reference

1. Singh RP. Foot and mouth disease control and elimination in India: Importance of herd immunity and critical disease control measures. Indian Farming. 2025 Apr;75(4):33-36.
2. Lather A, Kapoor S, Sharma R, Kakker NK. Sero-monitoring of foot and mouth disease vaccinated animals in eight districts of Haryana. Haryana Vet. 2015 Dec;54(2):181-183.
3. Office International des Epizooties (OIE). Manual of diagnostic tests and vaccines for terrestrial animals (terrestrial manual). 7th Ed. Paris: OIE; 2012.
4. Anderson RM, May RM. Vaccination and herd immunity to infectious diseases. Nature. 1985;318:323-329.
5. Lather A, Kapoor S, Sharma R, Kakker NK. Sero-monitoring of foot and mouth disease vaccinated animals in eight districts of Haryana. Haryana Vet. 2015 Dec;54(2):181-183.

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