International Journal of Veterinary Sciences and Animal Husbandry 2024; SP-9(3): 220-223

ISSN: 2456-2912
VET 2024; SP-9(3): 220-223

www.veterinarypaper.com
Received: 10-02-2024
Accepted: 16-03-2024

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Sero monitoring studies under Brucellosis Control Programme (BCP) in Andhra Pradesh during 2022-23

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Abstract
Brucella control programme is being implemented by the Government of India covering all the eligible population of 4-8 months of age females calves. The Animal Husbandry Department of Andhra Pradesh is planned to carry out this programme in three phases i.e. 1st phase in the month of July 2022, second phase in November 2022 and 3rd phase in the month of February 2023 in order to vaccinate all 4-8 months of female bovine calves scrupulously by following stringent guidelines and precautions carefully. After vaccination collected post vaccination sera samples between 45-60 days to carry out sero monitoring studies which may help us to know the vaccine efficacy and protection status among the vaccinated animals. By adapting all the prescribed guidelines and precautions strictly it is easy to achieve the main objective of the programme.

Keywords: Phases, sero monitoring, post vaccination sera, guidelines, objective

Introduction
Andhra Pradesh has cattle population of 46,00,087, Buffalo population of 62,19,499, Sheep population of 1,76,26,971, Goat population of 55,22,133 and Swine population of 91,958 as per the latest census. Brucellosis is a reproductive disease of major livestock includes Cattle, Buffaloes, Ovine, Caprine, Swine, wild animals and also aquatic animals resulting in huge financial losses and has an adverse impact on human health, as it has zoonotic potential. Farm workers and livestock owners are always at risk of contracting as well as spreading this disease. Hence, control of Brucellosis will have a double impact - both in human health and livestock health, besides rich economic gains to the animal owners / farmers. Brucellosis is a chronic zoonotic disease of great importance in public and animal health, being caused by Gram-negative, non-sporeforming, non-motile and facultative intracellular bacteria belonging to the genus Brucella [1, 2]. *Brucella* spp. is a highly infectious pathogen that affects numerous livestock (cattle, goats, sheep, pigs, dogs, horses and cats) and wild (dolphins, whales, rodents, camels, antelopes, bison, elk) animal species, besides humans [2]. Brucellosis of cattle and buffaloes caused by bacterium *Brucella abortus*. The disease is characterized by fever, induces abortion at the last stage of pregnancy, infertility, delayed heat, interrupted lactation resulting in loss of calves, loss in production of meat and milk. Cattle are mainly affected by *Brucella abortus* and the clinical signs of this infection are primarily related to reproductive problems, mainly abortion at the late pregnancy, reaching up to 80% in a susceptible herd at the time of introduction of the disease [2, 3, 4]. Besides abortion, the disease also causes in cows and their products: stillbirth, birth of weak calves, retained placenta, temporary or permanent infertility, perinatal mortality and chronic or diffuse interstitial mastitis [3, 5]. In bulls, the disease also affects primarily the reproductive system, causing orchitis, epididymitis, decreased sperm quality and subfertility or infertility [3]. Brucellosis has an adverse impact on human health as it is zoonotic (transmissible to humans). It is also a serious occupational hazard. Affected humans may exhibit undulating fever, night sweats, body pains and aches, poor appetite, weight loss and weakness. In the absence of any treatment for Brucellosis in bovine animals, the disease can be prevented by vaccination only. Control of Brucellosis can be achieved by a once-in-a-lifetime vaccination of all eligible female bovine calves (4–8 months old).
The overall aim of the Brucella Control Programme is to control Brucellosis by 2025 with vaccination and its eventual eradication by 2030 by Vaccinating the 100% Bovine female

calves (4-8 months) population of bovines once in a life time. Intensive Brucellosis Control programme in animals is envisaged for controlling Brucellosis which will result in effective management of the disease, in both animals and in humans.

Under this programme initially identify the target animals by ear-tagging, registration and uploading the data in the animal health module of Information Network for Animal Productivity and Health (INAPH). Upload the vaccination data in the INAPH – LITE MODE and maintain the vaccination record through Animal Health cards. Make sure that all the eligible female calves i.e. all the 4-8 months old female bovine calves should be vaccinated. All the technical officers should bring awareness among farmers that single shot of vaccination can save the life of their animal and at the same time their health also. After vaccination collect post vaccinated sera samples between 45-60 days of vaccination as per the sample plan conveyed by NIVEDI, Bengaluru to conduct sero monitoring studies.

Materials and Methods

All the female bovine calves of 4-8 months of age are main target population for our study. I view of target population, prepared Village wise action plan along with the vaccination teams before start of the program. One needle was used for one animal one syringe for 5 calves was used. Logistics supplied during previous round were utilized for this purpose. Vaccinated 100% bovine female calves (4-8 months) through S/C route with 2ml dose. Deworming of calves was done before vaccination. Cold chain (2-8 °C) was maintained throughout the programme. During the vaccination campaign vaccine bottles are continuously kept in vaccine carriers so that cold- chain is maintained. Vaccinators have taken care to avoid spillage of vaccine during filling up the syringe. Wastage of vaccine was minimized and it was not more than 2-3%. Vaccine bottles once opened (punctured) was used on the same day itself to avoid deterioration of potency / quality of vaccine. Before opening the vaccine bottle vaccinators checked for sufficient number of animals for vaccination to ensure maximum utilization of vaccine. Brucella vaccination was conducted as per the 20th Quinquennial livestock census. Vaccinator handed over the vaccination card duly signed by the Veterinary Officer, to every animal owner after vaccinating the particular animal. All vaccinators/Team members registered all vaccinated animal in INAPH app.

Care was taken that the dose of vaccine used was as per the manufacturer's instructions which are at present 2 ml for each calf and not to rupture bigger blood vessels which may cause emboli in the blood stream by administering through subcutaneous Route. Brucella vaccine was stored under temperature between 2 °C and 8 °C and used the diluents provided along with the vaccine only for re constitution.

Sero-Monitoring

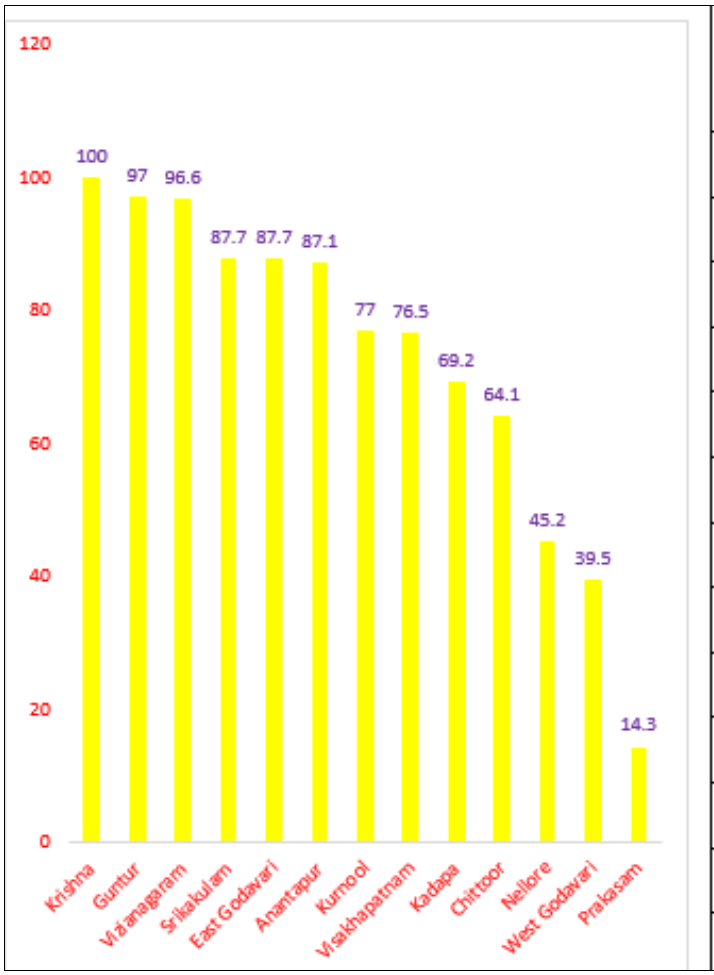
No Sero-surveillance/pre vaccination sample collection is required for Brucella vaccination. NIVEDI, Bengaluru has issued sero-monitoring plan for Brucellosis Control Programme for first phase and second phase of vaccination separately for collecting post vaccinated sera samples. After collection, the post vaccinated sera samples were sent to NIVEDI, Bengaluru for testing and analysis. During first phase of Brucella control programme a total of 1417 sera samples were collected from 109 selected villages across the state. During Second phase of Brucella control programme 2022-23 a total of 2022 sera samples were collected from 108 selected villages across the state. All the collected post vaccinated sera samples sent to NIVEDI, Bengaluru for testing and analysis. The district nodal officers were monitored the programme to follow the SOPs communicated by GOI for collection of post vaccinations sera samples, Animal identification and documentation.

Results and Discussion

The NIVEDI, Bengaluru has performed Enzyme Linked Immuno Sorbent Assay (ELISA) for all the Brucella post vaccinated sera samples of Andhra Pradesh collected in two different phases during the year 2022-23 to analyze the sero monitoring status of the animals. The results are as follows:

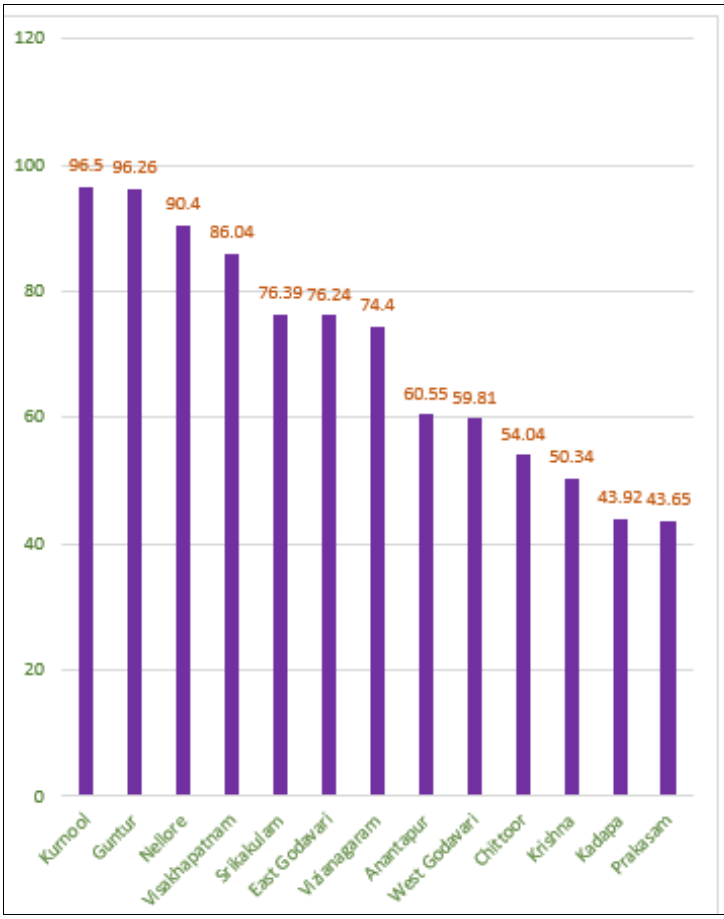
Andhra Pradesh BCP Seromonitoring Results 2022-23

First Phase Seromonitoring Results					Second Phase Seromonitoring Results		
S. No	District	No. of post vaccinated sera tested	Result		No. of post vaccinated sera tested	Result	
			Positive	% Protected		Positive	% Protected
1	Srikakulam	130	114	87.7	161	123	76.39
2	Vizianagaram	117	113	96.6	168	125	74.4
3	Visakhapatnam	247	189	76.5	344	296	86.04
4	East Godavari	130	114	87.7	181	138	76.24
5	West Godavari	91	36	39.6	107	64	59.81
6	Krishna	91	91	100.0	145	73	50.34
7	Guntur	65	63	96.9	107	103	96.26
8	Prakasam	91	13	14.3	126	55	43.65
9	Nellore	104	47	45.2	126	114	90.4
10	Chittoor	117	75	64.1	198	107	54.04
11	Anantapur	78	68	87.2	109	66	60.55
12	Kurnool	91	70	76.9	143	138	96.5
13	Kadapa	65	45	69.2	107	47	43.92
	Total	1417	1038	73.2	2022	1449	71.66



District	% Positivity
Krishna	100
Guntur	97
Vizianagaram	96.6
Srikakulam	87.7
East Godavari	87.7
Anantapur	87.1
Kurnool	77
Visakhapatnam	76.5
Kadapa	69.2
Chittoor	64.1
Nellore	45.2
West Godavari	39.5
Prakasam	14.3

I[st] Phase



District	% Positivity
Kurnool	96.5
Guntur	96.26
Nellore	90.4
Visakhapatnam	86.04
Srikakulam	76.39
East Godavari	76.24
Vizianagaram	74.4
Anantapur	60.55
West Godavari	59.81
Chittoor	54.04
Krishna	50.34
Kadapa	43.92
Prakasam	43.65

2[nd] Phase

It was finally conclude that during 1st phase of vaccination, more than 80% sero positivity was recorded in Krishna, Guntur, Vizianagaram, srikakulam, East Godavari and Anantapur districts. In Kurnool and Visakhapatnam more than 70% of sero positivity was recorded. And less than 70% sero positivity was recorded in Kadapa, Chittoor, Nellore, West Godavari and Prakasam districts. The state has achieved overall 73.2% of sero positivity on an average which is very much appreciable [6].

During second phase of vaccination, Kurnool, Guntur, Nellore and Visakhapatnam districts achieved more than 80% sero positive results as communicated by NIVEDI, Bengaluru. In Srikakulam, East Godavari and Vizianagaram more than 70% of sero positivity was recorded. And less than 70% sero positivity was recorded in Kadapa, Chittoor, Anantapur, West Godavari, Krishna and Prakasam districts. The state has achieved overall 71.66% of sero positivity on an average which is above 70%.

In both phases of vaccination Guntur, Visakhapatanm, Srikakulam, East Godavari, and Vizianagaram performed well with more than 70% sero positivity. The Guntur district sparks well with constant results in both the phases i.e. 97% and 96.26% respectively. West Godavari (39.5% & 59.8%) and Prakasam (14.3% & 43.6%) performed low in both the phases but with an ascending trend from 1st phase to 2nd phase which showed a good response to the sero monitoring programme. But the Krishna district performed excellently in the first phase with 100% but drops in the second phase to 50.34% which is very important to be concerned. The differences in the sero monitoring percentages might be depend upon the vaccine quality, cold chain maintenance of the vaccine vaccine coverage in all the eligible population and whether the sera samples were collected from the vaccinated or not etc.

The state has achieved overall sero positivity average above 70% i.e. 72.4% which is very much appreciable. Hence all the departmental staff should bring awareness about the disease and its consequences and convince that every farmer having female bovine calves aging between 4-8 months to take this Brucella calf hood vaccinaton to their eligible calf population (6). If this happen properly it is easy to fulfill the main objective of the Brucella control programme which is nothing but controlling of Brucellosis disease in Bovines by 2025.

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How to Cite This Article

Tanuja N, Kumari LR, Kumar RA. Sero monitoring studies under Brucellosis Control Programme (BCP) in Andhra Pradesh during 2022-23. International Journal of Veterinary Sciences and Animal Husbandry. 2024;SP-9(3):220-223.