



## Brucellosis Vaccination in India: 3.17 Crore Calves Vaccinated, but What Do the Data Reveal About Protection?

\*Raja Farhan Bin Bashir

PhD Scholar (Veterinary Medicine), FVSc and AH, SKUAST-K, India

\*Corresponding Author's email: [farhanbashirfb219@gmail.com](mailto:farhanbashirfb219@gmail.com)

Brucellosis remains an important livestock-health challenge because it can cause abortion, infertility and reduced reproductive performance in cattle and buffaloes, while also posing a zoonotic risk to people. Unlike many livestock infections, it can remain unnoticed until reproductive problems appear, allowing infection to persist within herds. India launched the National Animal Disease Control Programme (NADCP) in September 2019 to strengthen nationwide control of brucellosis and foot-and-mouth disease. The brucellosis component follows a targeted approach: a one-time vaccination of eligible female bovine calves aged 4–8 months using the authorised *Brucella abortus* S19 vaccine under programme guidelines. The programme has reached millions of calves. However, the next important question is whether vaccine delivery is consistent, whether animals develop measurable antibody responses and whether surveillance can demonstrate sustained reductions in infection.

### The scale of India's vaccination programme

Government figures published in 2026 provide an indication of the programme's reach.

| Indicator                                                        | Reported figure | Reporting period                |
|------------------------------------------------------------------|-----------------|---------------------------------|
| Female bovine calves vaccinated since programme inception        | 3.17 crore      | Up to March 2026                |
| Brucellosis vaccine doses administered to eligible female calves | 296.74 lakh     | During the preceding five years |
| Brucellosis vaccine doses administered cumulatively              | 4.39 crore      | Up to January 2025              |
| Brucellosis vaccine doses administered cumulatively              | 4.57 crore      | Up to February 2025             |
| Brucellosis vaccine doses administered during 2024               | 1.60 crore      | Calendar year 2024              |

Sources: Government of India and Department of Animal Husbandry and Dairying reports. These figures should not be added together because they refer to different reporting periods and may use different programme measures. The distinction between vaccine doses administered and individual calves vaccinated is particularly important: a dose count does not independently establish the number of unique animals protected. Nevertheless, the reported figures show that brucellosis vaccination has become a large-scale national intervention. The government also provides 100% central financial assistance for eligible vaccination activities under the Livestock Health and Disease Control Programme.

### What does post-vaccination monitoring reveal?

One of the most informative studies on the Indian programme was published in *Veterinary Immunology and Immunopathology* in 2025. Researchers assessed post-vaccination responses in bovine calves aged 4–8 months using indirect enzyme-linked immunosorbent assay (iELISA). The study analysed 19,893 serum samples collected during 2021–2024 from five

states and union territories: Andhra Pradesh, Chandigarh, Haryana, Odisha and Tamil Nadu. The reported species breakdown included 16,085 cattle calves and 3,609 buffalo calves; these figures total 19,694, leaving 199 samples unaccounted for in the abstract's breakdown. The discrepancy should be clarified from the complete paper before quoting species totals as exhaustive.

### Reported seroconversion rates

| Animal group or location | Seroconversion rate |
|--------------------------|---------------------|
| Cattle calves overall    | 75.87%              |
| Buffalo calves overall   | 67.22%              |
| Tamil Nadu               | 84.61%              |
| Chandigarh               | 80.77%              |
| Andhra Pradesh           | 69.52%              |
| Haryana                  | 69.43%              |
| Odisha, reported overall | 71.84%              |

*Source: Shome et al., 2025. These are study-specific estimates, not national coverage figures.* Seroconversion describes the proportion of tested animals developing detectable antibodies according to the study's testing criteria. It is an important indicator of the response following vaccination, but it is not the same as vaccine coverage, clinical protection or proof that infection has been eliminated. The results indicate that the measured response varied between locations. Tamil Nadu recorded the highest overall state-level rate among the locations listed, while Andhra Pradesh and Haryana had lower reported rates. Such differences warrant investigation into programme implementation, sampling, animal management and other factors rather than automatic assumptions that the vaccine itself performed differently.

### Cattle and buffaloes did not show identical responses

The study found a statistically significant difference between cattle and buffalo calves.

| Comparison             | Cattle | Buffaloes                                 |
|------------------------|--------|-------------------------------------------|
| Overall seroconversion | 75.87% | 67.22%                                    |
| Difference             | -      | 8.65 percentage points lower in buffaloes |

The reported difference was statistically significant ( $p < 0.001$ ).

This finding is important for a country where both cattle and buffaloes contribute substantially to dairy production. If monitoring relies only on combined bovine figures, weaker responses in one species may be obscured. The researchers also reported that some locations had species-specific gaps of approximately 10–15 percentage points. Their findings support more detailed buffalo-specific monitoring and investigation of local implementation practices. However, the study does not establish that buffaloes are inherently less capable of responding to the vaccine. Differences in sample composition, field conditions and programme delivery must be considered before drawing that conclusion.

### District-level results show why local monitoring matters

The 2025 study covered **98 districts, 734 blocks and 1,293 epidemiological units** across its five participating states and union territories. Its geographical coverage illustrates the scale of the monitoring exercise.

Several district-level results were particularly notable:

- Namakkal district in Tamil Nadu recorded a reported seroconversion rate of 100% in the study's sampled group.
- Jagatsinghpur district in Odisha recorded 97.85%.
- Odisha's reported buffalo-calve seroconversion improved from 17.64% in Phase I to 57.5% in a later phase.

These results provide examples of strong performance or improvement within the monitored areas. They should not be interpreted as proof that every calf in those districts was protected, or that these rates apply to the entire district population. The Odisha figures are particularly relevant because they suggest that performance can change over successive monitoring

phases. A low initial response should trigger investigation and corrective action, followed by repeat assessment. For programme managers, the practical lesson is clear: national averages are useful, but district- and species-specific data are needed to identify where additional attention is required.

### Why vaccine delivery and immune response must be measured separately

A vaccination programme has several distinct stages. Treating them as a single indicator can create a misleading picture of progress.

| Indicator                | What it tells us                                     | What it cannot establish by itself                                           |
|--------------------------|------------------------------------------------------|------------------------------------------------------------------------------|
| Doses administered       | Volume of vaccination activity                       | Number of unique animals protected                                           |
| Eligible-calve coverage  | Proportion of the target population vaccinated       | Whether every vaccinated animal developed a response                         |
| Seroconversion           | Detectable antibody response in the sampled animals  | Complete protection against infection                                        |
| Herd-level surveillance  | Evidence about disease occurrence and spread         | Absence of infection if sampling is inadequate                               |
| Confirmed disease trends | Changes in reported, investigated cases or outbreaks | True incidence unless surveillance and reporting are sufficiently consistent |

A stronger programme should link these indicators. For example, a district with high reported vaccination activity but lower-than-expected seroconversion may need a review of records, sampling methods, vaccine handling and field implementation. Similarly, a high seroconversion rate in a selected sample cannot replace representative surveillance for disease.

### Can vaccination alone eliminate brucellosis?

Vaccination is a central component of control, but it is not a substitute for all other measures. The *B. abortus* S19 vaccine is used under the Indian programme for eligible female bovine calves aged 4–8 months. It should be administered by trained personnel in accordance with the authorised protocol. Vaccination outside the recommended age or in inappropriate animals can complicate diagnostic interpretation and may create safety concerns, particularly in pregnant animals. The Government of India's standard veterinary guidance identifies several diagnostic approaches for investigating brucellosis, including the Rose Bengal Plate Test for screening, indirect and competitive ELISA, the standard tube agglutination test, culture and PCR. The appropriate method depends on the animal, herd situation and purpose of testing.

Effective control therefore requires a combination of:

- Vaccination of eligible calves according to programme guidance.
- Reliable animal identification and vaccination records.
- Appropriate diagnostic testing and investigation of reproductive problems.
- Safe handling and disposal of aborted fetuses, placentas and contaminated material.
- Surveillance and reporting of suspected outbreaks.
- Occupational precautions for veterinarians, farmers and animal handlers.

These measures reduce the risk of missed infection and help distinguish programme activity from measurable disease-control outcomes.

### What do official outbreak figures tell us?

Government releases show that brucellosis outbreak reporting remains an important measure of programme performance, but the figures must be interpreted carefully. A March 2026 government release reported a decrease from 22 brucellosis outbreaks in 2019 to 6 in 2025. A later August 2026 government backgrounder reported 15 outbreaks in 2025, compared with 22 in 2019. Because the two official publications give different figures for the same year, they should not be combined or presented as a single confirmed final count without

clarification from the department. Differences may relate to reporting cut-offs, definitions or revisions, but the available releases do not establish the reason. This discrepancy highlights a broader surveillance issue: reliable assessment of a national vaccination programme requires consistent definitions, transparent reporting periods and comparable datasets. Even a genuine decline in reported outbreaks would need to be interpreted alongside surveillance coverage, diagnostic confirmation and the possibility of under-reporting. Outbreak counts are valuable indicators, but they are not identical to the prevalence of infection across all livestock.

### Five data-driven priorities for the next phase

India's programme could be strengthened by publishing a consistent set of indicators each year:

- **Coverage by district:** Percentage of eligible female calves vaccinated, with the estimated target population stated.
- **Species-wise monitoring:** Separate cattle and buffalo results rather than only combined bovine figures.
- **Standardised seroconversion reporting:** Sampling design, sample size, confidence intervals and test criteria should be made clear.
- **Comparable disease surveillance:** Confirmed outbreak figures should use consistent definitions and clearly stated reporting cut-off dates.
- **Follow-up of underperforming areas:** Districts with lower coverage or seroconversion should be investigated and reassessed after corrective action.

A target should be accompanied by a clear denominator and a defined method of measurement. Otherwise, even a large number of administered doses may not reveal how much of the intended population has been reached.

### Conclusion

India's brucellosis vaccination programme has expanded substantially, with official reporting indicating that 3.17 crore female bovine calves had been vaccinated by March 2026. Research involving nearly 20,000 serum samples from five states and union territories has also provided useful evidence on post-vaccination responses, including differences between cattle and buffaloes and between geographical areas. The data show both progress and areas requiring closer examination. Vaccination totals describe programme activity; seroconversion describes an antibody response; and disease surveillance helps assess what is happening in the field. None of these indicators should be used as a substitute for the others. The next stage of progress depends on connecting vaccination records with representative monitoring and reliable disease reporting. The true measure of success is not simply how many calves receive a vaccine, but whether India can demonstrate consistent coverage, measurable immune responses and sustained reductions in brucellosis transmission.

### References

1. Press Information Bureau, Government of India, "Vaccination Targets under Livestock," Feb. 11, 2025. [Online]. Available: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2101852>.
2. Press Information Bureau, Government of India, "Livestock Health and Disease Control Programme," Mar. 18, 2026. [Online]. Available: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2241800>.
3. Department of Animal Husbandry and Dairying, Government of India, "Bharat Pashudhan," Press Information Bureau, factsheet, Aug. 2026. [Online]. Available: <https://www.pib.gov.in/FactsheetDetails.aspx?ModuleId=16&NoteId=150838&id=150838>.
4. R. Shome, P. Y. Konda, S. Gandu, S. Skariah, P. K. A. Muninarayanaswamy, S. M. Maharana, and N. Mohandoss, "Post-vaccination sero-monitoring of bovine calves in Indian subcontinent: A review on progress towards brucellosis control," Veterinary

- Immunology and Immunopathology, vol. 288, Art. no. 110999, Sep. 2025, doi: 10.1016/j.vetimm.2025.110999.
5. Department of Animal Husbandry and Dairying, Government of India, Standard Veterinary Treatment Guidelines for Livestock and Poultry. [Online]. Available: <https://www.dahd.gov.in/sites/default/files/2024-10/StandardVeterinaryTreatment.pdf>.
  6. Press Information Bureau, Government of India, “National Animal Disease Control Programme,” Aug. 22, 2026. [Online]. Available: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2302242>