



Tropentag, September 10-12, 2025, hybrid conference

“Reconcile land system changes
with planetary health”

Bridging the breeding gap: Tackling reproductive inefficiencies in India’s smallholder dairy sector

GARIMA DIGDARSHIKA¹, MAGESHWARAN BALU¹, ARUN KUMAR², MIZECK CHAGUNDA³,
THANAMMAL RAVICHANDRAN²

¹*Kumaraguru College of Technology, Microcosm, India*

²*Kumaraguru College of Technology, Dept. of Animal Husbandry, India*

³*University of Edinburgh, Centre for Tropical Livestock Genetics and Health (CTLGH), United Kingdom*

Abstract

The dairy sector is vital to India’s growth, contributing significantly to agricultural productivity, rural incomes, and food security, particularly in rural areas. Around 80 million smallholder dairy farmers in India manage over 300 million bovine animals, contributing 65–70 % of the nation’s milk supply. Typically, smallholder farmers in India own one to two milking animals. The widespread fragmentation of dairy farming poses significant challenges, including low productivity, inefficient breeding practices, and limited access to quality feed and veterinary services. One critical concern is repeat breeding, where cows fail to conceive even after three or more inseminations. Affecting over 20 % of dairy animals this leads to economic losses due to prolonged calving intervals, reduced lifetime milk yield, and increased expenses on repeated insemination and veterinary care. Although repeat breeding is multifactorial, determining context-specific factors is key to bridging the local breeding gap. To explore these causes, a qualitative field survey was conducted involving 100 dairy farmers managing 542 animals. Key variables examined included herd size, breeding practices, veterinary access, and farmer awareness. The majority of participating farmers were primarily involved in agriculture (60.2 %), with dairy as a secondary activity (57.4 %). Repeat breeding was observed in 26.01 % of animals, primarily cross-bred cows including Crossbred Jersey and Holstein Friesian. While 59.57 % conceived after three or more inseminations, 40.43 % remained non-pregnant, highlighting reproductive inefficiencies. Key contributing factors included poor heat detection, mineral deficiencies, and treatment delays or shortages of AI technicians and veterinarians. Only 35.56 % of farmers sought infertility treatment, while 71 % lacked access to training programs, hindering awareness of improved breeding practices. Although 74 % could identify the difference between veterinarians and AI technicians, 26 % lacked this understanding. Most farmers lacked awareness about the number of semen doses administered and sire details (64 %). The high incidence of repeat breeding, indiscriminate breeding services, and low infertility treatment collectively reflect major management gaps. These inefficiencies lead to reduced productivity, increased environmental footprint per unit of milk, and greater economic vulnerability. Addressing these issues through standardised AI protocols, fertility-focused genetic selection, and enhanced farmer training is vital for boosting productivity and fostering climate-resilient, smallholder dairy systems.

Keywords: Artificial insemination, repeat breeding, reproductive efficiency, smallholder dairy, veterinary access