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Sahiwal Cattle IVF Breakthrough — ICAR-IVRI Advances Indigenous Breed Conservation

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Sahiwal Cattle IVF Breakthrough — ICAR-IVRI Advances Indigenous Breed Conservation

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WHY IN NEWS

ICAR-Indian Veterinary Research Institute (ICAR-IVRI), Izatnagar, Bareilly achieved a landmark in livestock biotechnology with the successful birth of five healthy Sahiwal calves using OPU-IVF-ET (Ovum Pick-Up, In Vitro Fertilisation, Embryo Transfer) technology, beginning February 28, 2026.

Sahiwal Cattle IVF Breakthrough — Accelerating Indigenous Breed Improvement

The Achievement

The programme, initiated by ICAR-IVRI in 2022-23, targeted indigenous dairy breeds including Sahiwal cattle, Tharparkar cattle, and Murrah buffalo. The results are globally competitive:

PARAMETER	ACHIEVEMENT
Breed	Sahiwal
Technology	OPU-IVF-ET
Donor cow	High-yielding Sahiwal (~12 litres/day)
Semen source	Proven bull (~3,320 kg lactation yield)
Oocyte recovery rate	13.14 per session (Sahiwal)
Blastocyst production rate	Over 47%
Calves born	5 healthy calves (from Feb 28, 2026)

The blastocyst production rate exceeding 47% is **comparable to leading global laboratories**, marking a significant milestone for indigenous cattle breeding in India.

Understanding OPU-IVF-ET Technology

This three-step assisted reproductive technology enables rapid genetic multiplication:

Step 1 — OPU (Ovum Pick-Up): Ultrasound-guided transvaginal aspiration of immature oocytes (eggs) from the ovaries of a live, high-genetic-merit donor cow. Unlike conventional embryo transfer (which requires hormonal superovulation), OPU can be performed repeatedly — every 2 weeks — without harming the donor.

Step 2 — IVF (In Vitro Fertilisation): The harvested oocytes are matured in a laboratory for 22-24 hours, then fertilised with selected semen from genetically superior bulls. The fertilised embryos develop in culture for 7 days to the blastocyst stage.

Step 3 — ET (Embryo Transfer): Viable blastocysts are transferred into synchronised recipient (surrogate) cows. A single donor can produce **50-100 calves per year** through this technique, compared to just one calf per year through natural breeding.

Why Sahiwal Cattle?

Sahiwal is one of India's best indigenous milch (dairy) breeds, originally from the Sahiwal district of Punjab (now in Pakistan):

TRAIT	SAHIWAL	HOLSTEIN FRIESIAN (EXOTIC)
Origin	Indian subcontinent	Netherlands
Milk yield per lactation	1,400-2,500 kg	6,000-10,000 kg
Heat tolerance	Excellent	Poor
Disease resistance	High (tick-resistant)	Low in tropical conditions
Milk type	A2 milk	Predominantly A1 milk
Feed requirement	Low (thrives on local fodder)	High (requires concentrate feed)
Adaptability	Tropical/subtropical	Temperate

While Sahiwal's milk yield is lower than exotic breeds, its **heat tolerance, disease resistance, A2 milk production, and low input costs** make it ideal for Indian conditions. OPU-IVF-ET can rapidly multiply the genes of elite Sahiwal cows without resorting to crossbreeding.

The A2 Milk Dimension

Sahiwal cattle produce **A2 beta-casein milk**, which is considered easier to digest and healthier than A1 milk produced by most exotic breeds. The A2 milk market is growing globally, with premium pricing — this gives indigenous breeds a significant economic advantage.

India's Livestock Sector — Key Context

PARAMETER	DATA
Total cattle population	~303 million (20th Livestock Census 2019)
Total buffalo population	~109.85 million
Milk production	~230 million tonnes (2023-24)
India's global rank in milk production	1st (since 1998)
Contribution of livestock to agricultural GDP	~30%
Contribution to total GDP	~4.5%

India has the **world's largest bovine population** but average milk productivity per animal (~2,000 kg/lactation for indigenous cows) is significantly lower than global leaders like Israel (~12,000 kg/lactation). Technologies like OPU-IVF-ET can bridge this gap while preserving indigenous germplasm.

Government Programmes for Indigenous Cattle

PROGRAMME	YEAR	OBJECTIVE
Rashtriya Gokul Mission	2014	Development and conservation of indigenous breeds
National Kamdhenu Breeding Centre	2019	Centre of excellence for indigenous breeds (AP & MP)
National Livestock Mission	2014-15	Sustainable livestock development
Rashtriya Pashudhan Vikas Yojana	2023	Merged scheme for breed improvement

Private Sector Contribution

Beyond ICAR-IVRI, private companies are also scaling IVF for indigenous breeds. **Leads Genetics** conducted in-vitro fertilisation in 116 cows with a **70% success rate** in December 2025, followed by a second round in 160 Gir, Sahiwal, and Holstein Friesian cross cows — demonstrating commercial viability.

UPSC RELEVANCE

Sahiwal cattle (origin, breed type, A2 milk), OPU-IVF-ET technology, ICAR-IVRI location, 20th Livestock Census data.

MAINS GS-3:

Application of biotechnology in agriculture and animal husbandry; conservation of indigenous livestock breeds; India's dairy sector challenges and technology-driven solutions.

📌 FACTS CORNER — KNOWLEDGEPEDIA

ICAR-IVRI SAHIWAL IVF PROGRAMME:

Institute: ICAR-IVRI, Izatnagar, Bareilly (Uttar Pradesh)

Programme started: 2022-23

Technology: OPU-IVF-ET

Target breeds: Sahiwal, Tharparkar, Murrah buffalo

Blastocyst rate: >47% (globally competitive)

Result: 5 healthy Sahiwal calves (from Feb 28, 2026)

SAHIWAL CATTLE:

Origin: Sahiwal district, Punjab (now in Pakistan)

Type: Milch (dairy) breed

Yield: 1,400-2,500 kg per lactation

Characteristics: Heat-tolerant, tick-resistant, A2 milk

Other key indigenous dairy breeds: Gir, Tharparkar, Rathi, Red Sindhi

INDIA'S DAIRY SECTOR:

Milk production: ~230 million tonnes (2023-24)

Global rank: 1st (since 1998)

Cattle population: ~303 million (20th Livestock Census 2019)

Operation Flood: launched 1970 by Dr Verghese Kurien (NDDB)

White Revolution made India world's largest milk producer

KEY INSTITUTIONS:

ICAR: Indian Council of Agricultural Research (est. 1929; under Ministry of Agriculture)

IVRI: Indian Veterinary Research Institute (est. 1889; Bareilly, UP)

NDRI: National Dairy Research Institute (Karnal, Haryana)

NDDB: National Dairy Development Board (Anand, Gujarat)

OTHER RELEVANT FACTS:

India's first IVF cattle calf "Holi" was born at NDRI, Karnal

20th Livestock Census: conducted in 2019

> Rashtriya Gokul Mission: budget Rs 2,400 crore
>
> National Kamdhenu Breeding Centres: Andhra Pradesh and Madhya Pradesh

Sources: ICAR , Down to Earth , Rural Voice

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