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Sahiwal Cattle: A Legacy of Heat Tolerance and Productivity in India's Premier Dairy Zebu

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Abstract:

Sahiwal cattle are widely regarded as one of India's finest indigenous dairy breeds, a Bos indicus animal that traces its roots to the Sahiwal district (formerly Montgomery) of Punjab, now in Pakistan, and which today thrives across the semi-arid tracts of Ferozepur and Amritsar in Punjab and Sri Ganganagar in Rajasthan, with organized herds also maintained in Haryana, Uttar Pradesh, Delhi, Bihar, and Madhya Pradesh. Formally registered with the National Bureau of Animal Genetic Resources, Sahiwal has earned its reputation not just for its comparatively high milk output among indigenous breeds, but for doing so while shrugging off heat stress, disease pressure, and the kind of low-input management that would leave most dairy breeds struggling. This review pulls together what the scientific literature tells us about the breed's origin, population trends, production and reproductive performance, genetic makeup, and the conservation efforts now underway to protect it. Long-term herd records from ICAR-NDRI, Karnal, spanning nearly three decades, show 305-day milk yields typically ranging between about 1,820 and 2,260 kg across parities, with lactation lengths of roughly 270 to 300 days and milk fat content generally sitting between 4.5 and 5%, figures that hold up reasonably well against the demands of tropical dairy farming. Reproductive parameters point to a breed that matures and cycles predictably enough for structured breeding programmes, with age at first calving typically falling between 37 and 41 months, gestation lengths around 287 to 288 days, and calving intervals near 420 days, though heritability estimates for these traits remain modest, underlining just how much environment and management still shape outcomes. Sahiwal's national population stands at roughly 4.88 million animals, close to 3.2% of India's total cattle and nearly 13% of all registered indigenous cattle, a number that, like most desi breeds, has felt the pressure of decades of crossbreeding. In August 2025, ICAR-NDRI launched India's first dedicated genomic selection programme for Sahiwal cattle, signalling a new phase in the breed's improvement, one built on molecular tools rather than pedigree and progeny records alone. Taken together, the evidence positions Sahiwal cattle as a genuinely valuable, climate-resilient dairy genetic resource, one whose continued conservation and scientific development carries real weight for India's tropical dairy future.

Keywords: Sahiwal cattle, Indigenous breed, Bos indicus, Heat tolerance, Milk production, Reproductive performance, Genomic selection, Conservation

Introduction:

Among India's indigenous cattle breeds, few carry the dairy reputation that Sahiwal does. It belongs to the zebu group, hump-backed cattle native to the Indian subcontinent, and its home tract lies in the dry plains along the Indus, specifically the Sahiwal district of Punjab province, which today falls within Pakistan. After Partition in 1947, the breed's distribution shifted, and pure herds became concentrated mainly around Fazilka and Abohar in Ferozepur district, Punjab, along with pockets in Amritsar and Sri Ganganagar in Rajasthan.

What sets Sahiwal apart from many of its indigenous counterparts is the sheer consistency with which it has been studied. Decades of performance recording at organized institutional herds, particularly at ICAR-National Dairy Research Institute, Karnal, have generated one of the more complete production and reproduction datasets available for any Indian zebu breed. This body of evidence, layered with more recent genomic work, gives a fairly detailed picture of how the breed performs, how it reproduces, and what its genetic makeup actually looks like.

Origin, Native Tract, and Population Status:

Sahiwal cattle carry a handful of regional names, Lambi Bar, Lola, Montgomery, Multani, and Teli, names that trace back to the herding communities and geography of their native tract. The breed is reddish-brown in colour, sometimes with white patches on the belly or neck, with darker extremities in bulls, a well-developed udder, a moderate dewlap, and comparatively short horns. Adult bulls typically weigh around 540 kg and stand about 170 cm at the withers, while cows are noticeably smaller, averaging somewhere between 327 and 408 kg depending on the source.

In India, the breed's core breeding tract remains Ferozepur and Amritsar districts of Punjab and Sri Ganganagar district of Rajasthan, though pedigree herds are also maintained more broadly across Haryana, Uttar Pradesh, Delhi, Bihar, and Madhya Pradesh. According to figures drawn from NBAGR records, the current Sahiwal population in India stands at approximately 4.88 million animals, representing about 3.23% of the country's total cattle population and nearly 12.87% of all registered (recognized indigenous) cattle breeds. Sahiwal's international reach is worth noting too, the breed has been exported widely enough that it now numbers in the tens of thousands across parts of Africa, Asia, Australia, and the Caribbean, and has contributed to the development of composite tropical dairy breeds abroad, including the Australian Friesian Sahiwal and the Australian Milking Zebu.

As with most Indian zebu breeds, Sahiwal's population has not been immune to the pressures of large-scale crossbreeding programmes pursued over the past several decades, and pure-breeding within its traditional tract has increasingly had to compete with farmer preference for crossbred, higher-volume milkers. This dynamic is precisely what has made structured conservation and genomic improvement efforts for the breed increasingly urgent.

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Fig. ICAR- NDRI, Sahiwal Bull

Production Performance:

Sahiwal has long carried the label of India's best milch zebu breed, and the data broadly supports that reputation, at least relative to other indigenous cattle. A widely cited average lactation yield of around 2,325 kg is often quoted for the breed, with a practical field range of roughly 1,600 to 2,750 kg depending on management. First-lactation yields specifically have been reported in the range of about 1,597 to 2,125 kg under Indian conditions.

Long-term data from the organized Sahiwal herd at ICAR-NDRI, Karnal, covering nearly three decades of records (1988–2016) and tracked across six parities, offers a more granular picture: 305-day milk yield ranged from about 1,823 to 2,166 kg, total lactation yield from roughly 1,823 to 2,260 kg, and lactation length varied between 269 and 303 days depending on parity. Peak daily yield in this herd ranged from about 10.6 to 14.1 kg, typically reached within 39 to 52 days into lactation, with dry periods running from around 118 to 142 days. Milk fat content in Sahiwal generally sits between 4 and 5%, giving it real value for traditional dairy products beyond fluid milk alone.

Reproductive Characteristics:

Reproductive data from the same long-term NDRI herd study paints a picture of a breed that, while not exceptionally fast-maturing, reproduces with reasonable predictability under organized management. Average age at first service was recorded at around 26.5 months, with age at first calving averaging approximately 1,116 days, or a little over 36.5 months. Gestation length averaged about 287.7 days, calving-to-first-insemination interval around 85 days, service period near 120 days, and calving interval close to 420.5 days, with an overall pregnancy rate hovering around 27%.

Field-level studies conducted outside the breed's native tract tell a somewhat different story,

underscoring how much environment shapes these numbers. A study evaluating Sahiwal heifers reared in the humid climate of Assam, well outside their traditional dry, semi-arid habitat, reported an average age at first calving of around 1,237 days, with considerable variability, and found that despite the unfamiliar climatic conditions, the breed still performed creditably, suggesting a genuine capacity to adapt beyond its home tract. Heritability estimates for reproductive traits in Sahiwal have generally come out low to moderate, ranging from about 0.09 to 0.27 across different traits, a reminder that management and environmental factors continue to play the larger role in shaping fertility outcomes, even in a breed as well-characterized as this one.

Adaptive Capacity and Durability:

Sahiwal's real strength lies less in raw output and more in its ability to keep producing under conditions that would derail most specialized dairy breeds. It combines comparatively high milk yield with strong heat tolerance, decent disease resistance, and low maintenance requirements, a combination that has made it not just India's leading indigenous milch breed but also a genetic resource sought after internationally for developing composite tropical dairy cattle. This same hardiness explains why crossbreeding programmes abroad, including the Australian Friesian Sahiwal programme initiated in 1961, deliberately built on Sahiwal genetics specifically to bring heat and tick tolerance into taurine dairy lines, without needing to separately test for thermal stress resistance, since the breed's tolerance was already well established.

Conservation, Policy Support, and Genetic Improvement:

As a formally recognized indigenous breed under the National Bureau of Animal Genetic Resources, Sahiwal benefits from India's broader institutional framework for indigenous bovine conservation and development. NBAGR itself operates dedicated breeding farms for the breed, focused on performance evaluation, selective breeding, and in-situ conservation aimed at raising productivity without eroding the traits that make Sahiwal what it is. National programmes such as the earlier National Programme for Bovine Breeding and the more recent Rashtriya Gokul Mission, while not targeting Sahiwal exclusively, provide the wider policy and infrastructure support, artificial insemination coverage, semen production, genomic selection initiatives, that the breed draws upon alongside other indigenous cattle.

The most significant recent development came in August 2025, when ICAR-NDRI launched India's first dedicated genomic selection programme for Sahiwal cattle, a move aimed squarely at accelerating genetic improvement in the breed while reducing India's dependence on exotic germplasm for dairy productivity gains. This marks a meaningful shift for a breed whose improvement has historically rested on pedigree recording and progeny performance, moving instead toward molecular tools capable of identifying superior animals far earlier in life.

Future Perspectives and Conclusion:

Where Sahiwal goes from here will likely depend on how well genomic tools can be layered onto the decades of phenotypic recording already available for the breed. Combining the newly launched genomic selection programme with continued field-level performance recording offers a real opportunity to raise milk yield and improve reproductive efficiency without compromising the heat tolerance and disease resistance that have always been Sahiwal's defining strengths. Given the modest heritability of its reproductive traits, management-side improvements, better nutrition, more consistent breeding protocols, are likely to matter just as much as genetic selection itself.

Taken as a whole, Sahiwal cattle represent a genuinely well-documented, moderately high-yielding indigenous dairy resource, one whose reproductive stability and environmental resilience have been proven both within its native tract and, increasingly, well beyond it. Sustained institutional support, structured breeding programmes, and the new wave of genomic tools now being applied to the breed will be key to ensuring Sahiwal continues to serve as a cornerstone of India's tropical dairy sector for years to come.

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