TRAINING & WORKSHOP

PREVENTION AND SUSTAINABILITY IN THE INDIAN DAIRY SECTOR

FOR PRODUCTIVITY, LIVELIHOOD GENERATION AND CLIMATE RESILIENCE



Livestock breeds for resilience

Dr. Vibha Varshney
Principal Programme Manager
Biodiversity and Food
Centre for Science and Environment

India’s rich diversity of indigenous livestock

- India is home to one of the world’s largest and most genetically diverse indigenous livestock populations. This includes cattle, buffalo, sheep, goats, pigs, camels, horses, donkeys, yaks and mithun, among other animals
- Livestock supports rural livelihoods, providing income, assets that can be sold during crises, dung for farming and draught power
- Small and marginal farmers, pastoralists and landless households depend on livestock for their livelihood
- Conserving indigenous livestock diversity is an investment in resilient livelihoods and adaptation to environmental change

Why indigenous livestock breeds matter

- Over thousands of years, natural selection and the choices of farmers and pastoralists have shaped animals suited to different agroclimatic conditions
- Many are hardy, low-maintenance animals suited to harsh environments and low-input farming systems
- As climate change intensifies heat stress, erratic rainfall and shifting disease patterns, locally adapted genetic resources become increasingly important

Livestock census

Species	Population (In million) 2019	Population (In million) 2012	Population (In million) 2007
Cattle	193.49	190.9	199.08
Buffaloes	109.85	108.7	105.34
Sheep	74.26	65.07	71.56
Goats	148.88	135.17	140.54
Pigs	9.06	10.29	11.13
Mithun	0.38	0.3	0.26
Yaks	0.06	0.08	0.08
Horses & ponies	0.34	0.63	0.61
Mules	0.08	0.2	0.14
Donkeys	0.12	0.32	0.44
Camels	0.25	0.4	0.52
Total Livestock	**536.78**	**512.06**	**529.7**

India’s indigenous livestock wealth

- According to the 20th Livestock Census, India had approximately 536.8 million livestock. This includes exotic, registered indigenous and non-descript livestock
- Around 89.3 per cent of this population was indigenous or non-descript.
- Indigenous and non-descript animals remain central to India’s livestock population and rural economy
- ICAR’s National Bureau of Animal Genetic Resources (NBAGR) has documented and registered indigenous breeds across multiple livestock. Currently, total number of registered breeds stand at 262, including 258 indigenous and four synthetic breeds

State status

- Eight states (Chhattisgarh, Arunachal, Dadra and Nagar Haveli, Lakshadweep, Jharkhand, Telangana, Rajasthan, MP) can be termed Excellent (≥95 per cent)
- Six states (Daman and Diu, Assam, Manipur, Odisha, UP, West Bengal) High (90–94 per cent)
- 11 states (Bihar, Andhra Pradesh, Maharashtra, Karnataka, Gujarat, Haryana, Uttarakhand, Meghalaya, Tripura, Delhi and Andaman and Nicobar Islands) Moderate (80–89 per cent)
- Five states (Goa, Himachal Pradesh, Punjab, Chandigarh, Tamil Nadu) Low (65–79 per cent)
- Six states (Jammu and Kashmir, Nagaland, Puducherry, Sikkim, Kerala, Mizoram) Very Low (<65 per cent)

	Total (indigenous + exotic)	Indigenous/non-descript
Livestock (all categories)	536,761,343	479,419,861
Cattle	193,462,871	142,106,466
Sheep	74,260,615	70,172,482
Pig	9,055,488	7,158,544
Buffalo		109,851,678
Goat		148884,786
Horses and ponies		342,226
Mules		84,261
Donkeys		123,587
Camels		251,956
Yaks		57,570
Mithun		3,86,305

State /UT	Total	Total Indigenous/ non-descript	Indigenous %	Cattle %	Sheep %	Pig %	Buffaloes %	Goats %	Horses/ ponies %	Mules %	Donkeys %	Camels %
UP	68,012,945	61,796,702	90.86	20.87	1.51	0.59	53.43	23.43	0.123	0.014	0.026	0.004
Raj.	56,800,945	54,424,149	95.82	21.34	14.43	0.27	25.16	38.29	0.062	0.002	0.043	0.391
MP	40,637,375	38,932,291	95.80	43.81	0.82	0.41	26.47	28.42	0.034	0.007	0.021	0.005
Bihar	36,540,820	32,405,168	88.70	34.86	0.63	0.98	23.82	39.57	0.099	0.005	0.035	0.000
HP	4,412,846	3,270,322	74.10	23.21	21.97	0.05	19.77	33.89	0.271	0.624	0.147	0.001
Pun.	7,050,355	4,889,215	69.30	8.71	1.51	0.19	82.14	7.12	0.291	0.034	0.010	0.002

Issues

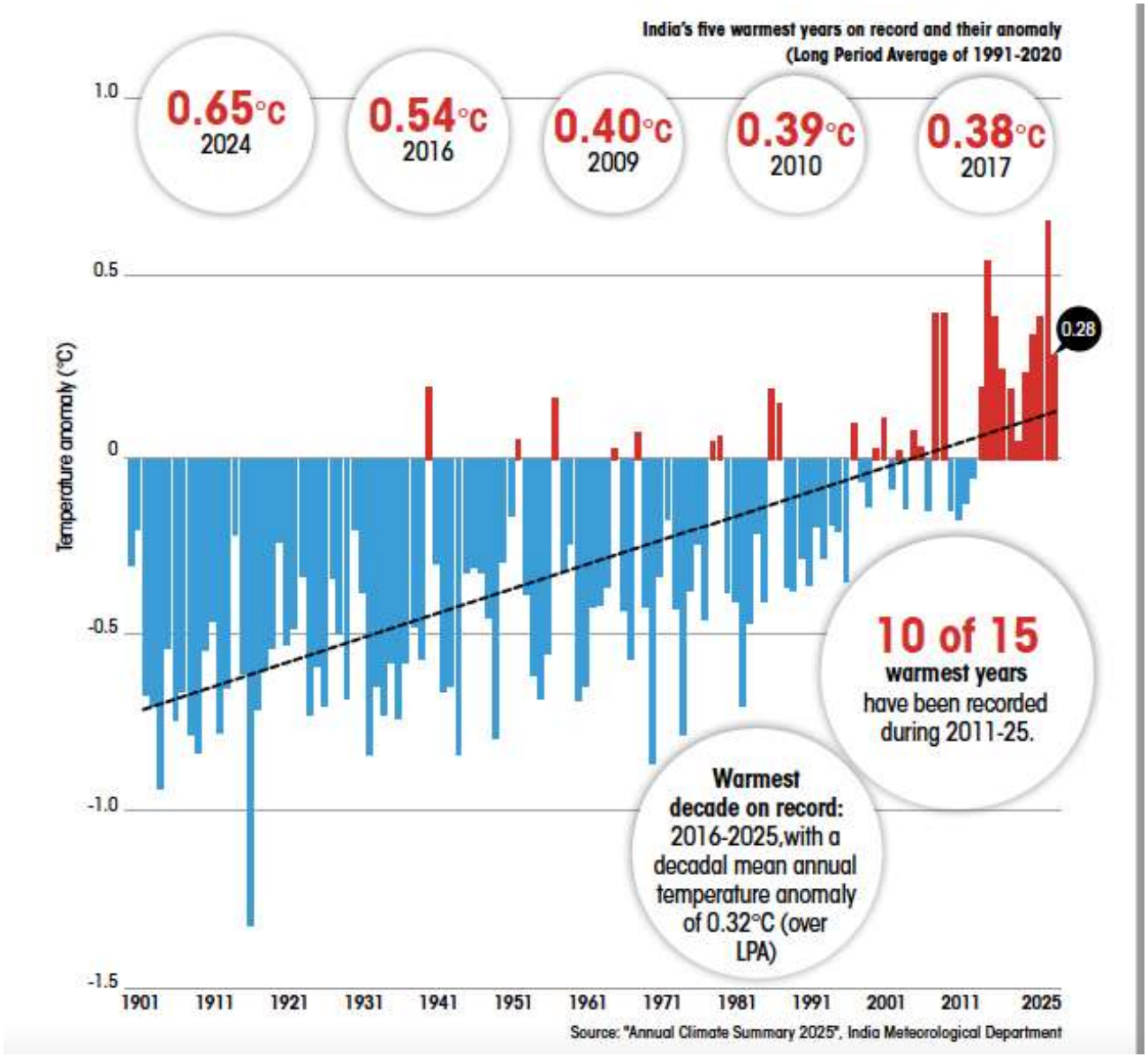
- While the national average for indigenous breeds looks fine on the surface but species-level breakdowns of indigenous breeds in states reveal a more nuanced picture
- Species like buffalo and goat, which are mostly indigenous, raise the national figure, but this masks the erosion of indigenous cattle breeds in states due to large-scale crossbreeding with exotic breeds (HF, Jersey) to meet dairy demands
- This means the crisis is not a livestock-wide crisis, but a specific cattle-linked crisis

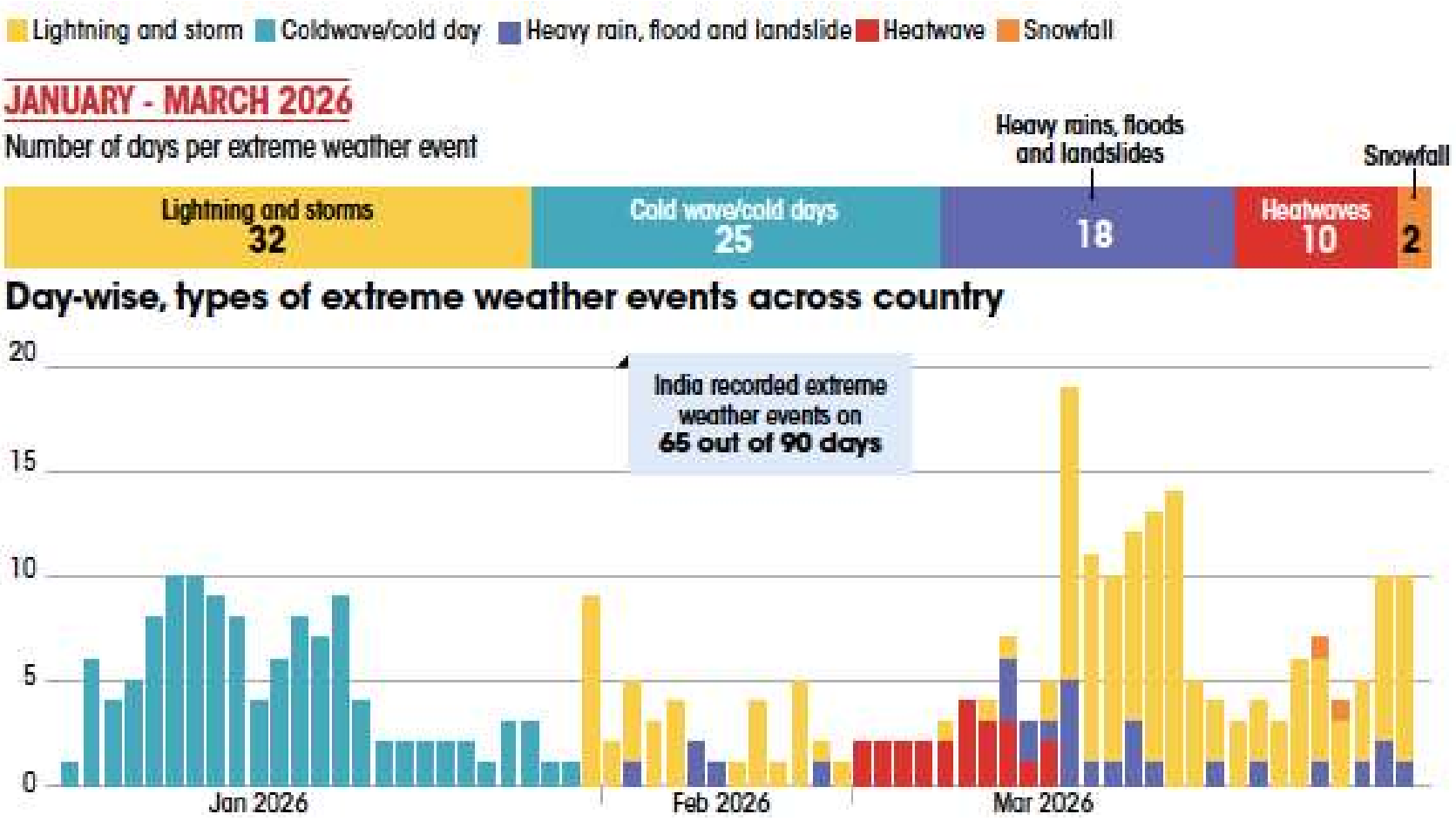
A rich genetic resource under pressure

- National livestock numbers can conceal the decline of individual breeds and the loss of unique genetic traits
  - Cattle: Decades of dairy-focused crossbreeding have put indigenous cattle genetics under pressure
  - Working animals: Donkeys, horses, mules and camels have declined by 44–73 per cent since 2007, according to the report
  - Pigs: National-level figures mask steep declines in some states
- Undocumented diversity: Many animals with potentially valuable locally adapted traits remain uncharacterised and unregistered
- Global concern: FAO has recorded nearly 100 livestock breeds going extinct worldwide between 2000 and 2014. The conservation of genetic material in gene banks remains limited

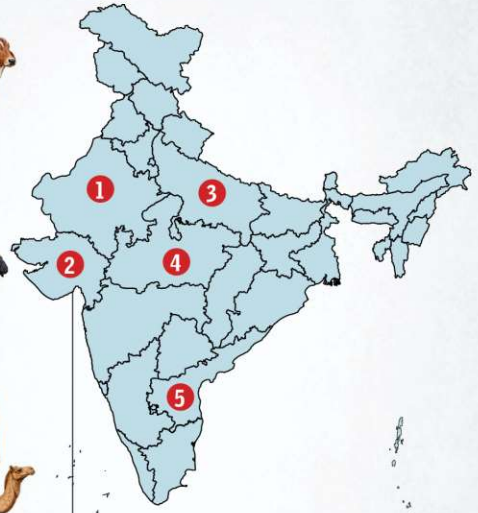
State of Climate

- The years 2023 to 2025 were collectively more than 1.5°C warmer than pre-industrial levels, making this the warmest three-year period on record globally
- 2025 was India's eighth warmest year on record, with the national average temperature 0.28°C above the 1991-2020 long-period average (LPA)
- Warmest decade on record: 2016-2025, with a decadal mean annual temperature anomaly of 0.32°C (over LPA)


India's five warmest years on record and their anomaly
(Long Period Average of 1991-2020
0.65°C
2024
0.54°C
2016
0.40°C
2009
0.39°C
2010
0.38°C
2017
1.0
0.5
0
-0.5
-1.0
-1.5
Temperature anomaly (°C)
0.28
10 of 15
warmest years
have been recorded
during 2011-25.
Warmest
decade on record:
2016-2025,with a
decadal mean annual
temperature anomaly
of 0.32°C (over
LPA)
1901
1911
1921
1931
1941
1951
1961
1971
1981
1991
2001
2011
2025
Source: "Annual Climate Summary 2025", India Meteorological Department


Lightning and storm
Coldwave/cold day
Heavy rain, flood and landslide
Heatwave
Snowfall
JANUARY - MARCH 2026
Number of days per extreme weather event
Heavy rains, floods and landslides
Snowfall
Lightning and storms
32
Cold wave/cold days
25
18
Heatwaves
10
2
Day-wise, types of extreme weather events across country
India recorded extreme weather events on
65 out of 90 days
20
15
10
5
0
Jan 2026
Feb 2026
Mar 2026

DROUGHT-ADAPTED BREEDS



1

RAJASTHAN

RATHI CATTLE

Only viable high-yield dairy cow for Thar zone. Low Population status.

NAGORI CATTLE

Heavy draught in deep sand; Rajasthan pastoral backbone.

MARWARI SHEEP

Long-distance arid grazing; survives scarce fodder. Pastoral system breed.

JAISALMERI CAMEL

Desert specialist; popular for transport. Declining with mechanization.

BIKANERI CAMEL

Survives 1–49°C. Zero substitute in Thar. Camel population halved since 2007.

MARWARI GOAT

Inhospitable arid conditions specialist; largest state goat population.

2

GUJARAT

HALARI DONKEY

Only 1,112 animals. No conservation farm. Excellent drought & heat tolerance; strong walking ability.

3 4

UTTAR PRADESH/ MADHYA PRADESH

BHADAWARI BUFFALO

Survives on low-quality fodder in ravines; 8-11 per cent butterfat milk. Drought-resilient dairy.

1 2

RAJASTHAN/GUJARAT

THARPARKAR CATTLE

Survives 48°C; <200mm rainfall. Gold standard for Thar Desert farming.

KANKREJ CATTLE

Heaviest Indian breed; deep sand draught; drought and heat tolerant.

5

ANDHRA PRADESH

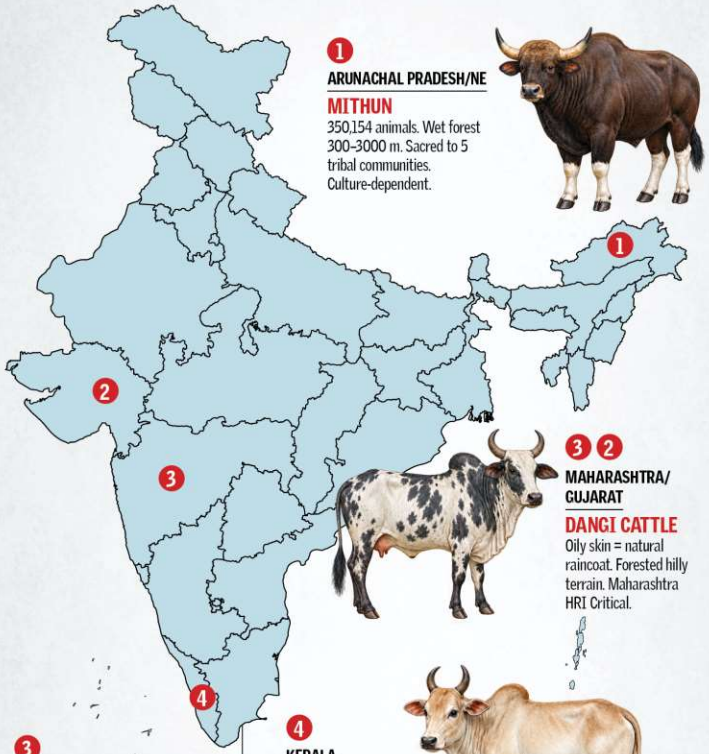
ONGOLE CATTLE

Hardiness, disease resistance; thrives on scanty/dry fodder

PUNGANUR CATTLE

Only 2,772 animals. Small compact breed adapted to dry conditions

HUMID AND HIGH RAINFALL BREEDS



1
ARUNACHAL PRADESH/NE
MITHUN
350,154 animals. Wet forest 300–3000 m. Sacred to 5 tribal communities. Culture-dependent.

3 2
MAHARASHTRA/ GUJARAT
DANGI CATTLE
Oily skin = natural raincoat. Forested hilly terrain. Maharashtra HRI Critical.



4
KERALA
VECHUR CATTLE
Only 1,065 animals. World's smallest. Hot humid Kerala adapted. Kerala HRI critical.

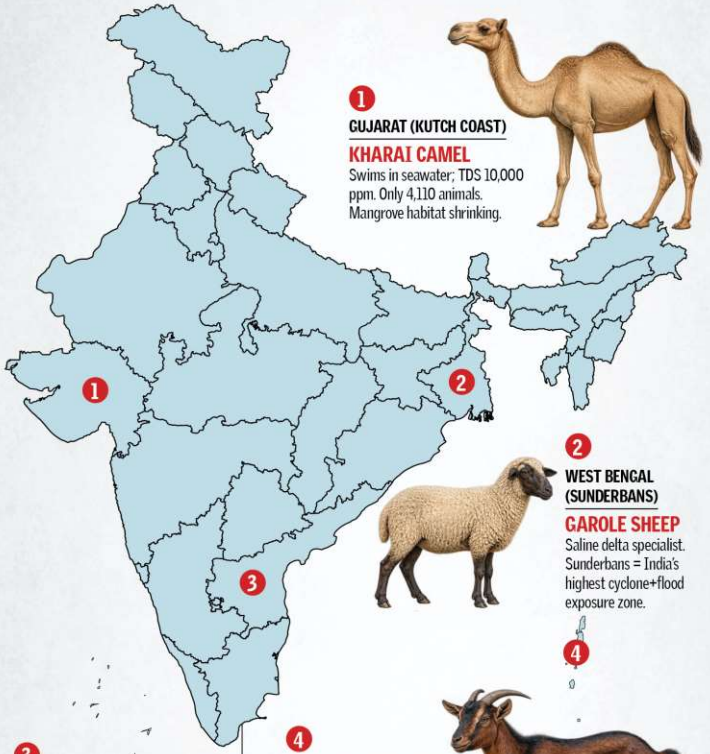
3
MAHARASHTRA (KONKAN)
KONKAN KANYAL GOAT
Konkan coastal high-rainfall adapted. Very limited population. No conservation programme.



KERALA (NILGIRIS)
ATTAPADY BLACK GOAT
High-range tribal area. Declining with tribal displacement. Kerala HRI Critical.



CYCLONE AND COASTAL BREEDS



1
GUJARAT (KUTCH COAST)
KHARAI CAMEL
Swims in seawater; TDS 10,000 ppm. Only 4,110 animals. Mangrove habitat shrinking.

2
WEST BENGAL (SUNDERBANS)
GAROLE SHEEP
Saline delta specialist. Sunderbans = India's highest cyclone+flood exposure zone.

4



4
ANDAMAN AND NICOBAR ISLANDS
TERESSA GOAT
Island-endemic. One cyclone eliminates entire breeding population. Zero backup.

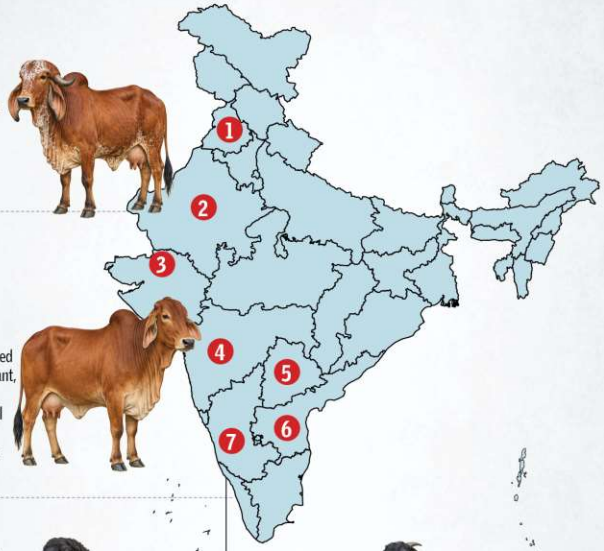


ANDAMANI GOAT
150-year island presence; cyclone-zone adapted. Disaster contingency plan needed.

3
ANDHRA PRADESH COAST
NELLORE BROWN SHEEP
Hot humid coastal Andhra; cyclone-prone belt. AP CVI Very High HRI Critical.



HEAT-ADAPTED BREEDS



3

GUJARAT/ NATIONAL

GIR CATTLE

Most demanded AI semen nationally. Stress-tolerant; tropical disease-resistant

1 2

PUNJAB/ RAJASTHAN

SAHIWAL CATTLE

Best zebu dairy breed globally. Heat tolerant, Disease resistant, Suitable for tropical climates, High milk productivity among native breeds

4 5 7

MAHARASHTRA/ TELANGANA/ KARNATAKA

DECCANI SHEEP

Deccan plateau heat-adapted; long-distance grazing on monsoon grasslands.



4

MAHARASHTRA

OSMANABADI GOAT

Early maturity; prolific; Marathwada extreme heat (50°C+) adapted.



6

ANDHRA PRADESH

PUNGANUR CATTLE

Only 2,772 animals. Dwarf heat-adapted cattle. No dedicated breeding farm at scale



NELLORE SHEEP

Hot humid coastal Andhra. 53.7 per cent of AP's entire indigenous herd is sheep.



7

KARNATAKA

MALNAD GIDDA CATTLE

World's smallest cattle; adapted to heat and tough low/zero input system; Western Ghats; Karnataka cattle -30.9 per cent.



EXTREME COLD AND HIGH ALTITUDE BREEDS



1

LADAKH (NUBRA VALLEY)

DOUBLE HUMPED CAMEL

102 animals. India's only Bactrian camel. Rarest domestic breed. Near extinction.

1

LADAKH

ZANSKARI HORSE

Near extinction. Breeding farm at Leh established. Sustainable mountain tourism linkage needed.

2

JAMMU AND KASHMIR

BAKHERWAL SHEEP

Bakherwal nomadic breed. Entirely migratory. Route blockage = breed collapse.

1 2

LADAKH/JAMMU AND KASHMIR



CHANGTHANGI GOAT

40°C adaptable. World's finest Pashmina (9–12 micron). Climate change shrinking habitat.



CHANGTHANGI SHEEP

Tibetan highland specialist. Pashmina-producing. Most climate-vulnerable breed in India.



LADAKHI YAK

26,221 animals. 5,000m altitude. Only transport and milk source in extreme terrain.



LADAKHI DONKEY

Cold tolerance very high. 5–20 km/day in extreme terrain. Near extinction.

3 2

HIMACHAL PRADESH/JAMMU AND KASHMIR



GADDI SHEEP

Gaddi tribal transhumant breed. Grazing routes under road development pressure.

3

HIMACHAL PRADESH



SPITI HORSE

1,010 animals. 5,000-15,000 ft. Army use. NBAGR+HPKV programme active but needs scaling.

4

ARUNACHAL PRADESH



ARUNACHALI YAK

24,075 animals. Eastern Himalaya. Monpa community cultural anchor. Herder abandonment risk.

Policy overview

- Eight major livestock/animal-husbandry schemes listed by India's Department of Animal Husbandry and Dairying
  - Rashtriya Gokul Mission (RGM)
  - National Livestock Mission (NLM)
  - Livestock Health & Disease Control Program (LHDCP)
  - National Programme for Dairy Development (NPDD)
  - Livestock Census & Integrated Sample Survey (LC&ISS)
  - Animal Husbandry Infrastructure Development Fund (AHIDF)
  - Supporting Dairy Cooperatives & Farmer Producer Organizations (SDCFPO)
  - Dairy Processing & Infrastructure Development Fund (DIDF)
- Only Rashtriya Gokul Mission explicitly promotes indigenous bovine breeds
- In year 2025-2026, approximately 13.20 per cent of the budget available with the department of Animal Husbandry was allocated for RGM
- A large chunk of the budget carries no obligation toward indigenous breed conservation. In fact, the other schemes often accelerate crossbreeding through AI with exotic semen, dairy productivity incentives, and provision of infrastructure
- Indigenous cattle declined by 9.07 million nationally between 2012 and 2019 while RGM was active

Uttar Pradesh

- Uttar Pradesh has India's largest livestock population, backed by strong government schemes and heavy investment through the RGM
- Indigenous breeds are heat tolerant. Despite this, their numbers are declining fast. Between 2012 and 2019, the indigenous cattle numbers have fallen by 19.3 per cent, sheep numbers fell by 26.6 per cent, and pigs went down by 68.2 per cent
- Dairy farmers are increasingly replacing native cattle with exotic breeds to boost milk yield
- UP is climate change vulnerable and could do well by protecting the heat-resilient indigenous breeds

Recommendations

- Protecting genetic diversity requires better documentation of breeds and populations, including animals that remain classified as non-descript
- India's indigenous livestock wealth requires greater recognition in policy, planning and investment
- India needs species-specific, climate-aware policies that protect indigenous livestock diversity and support the communities that sustain it
- Indigenous livestock conservation must be linked to the realities of farmers and pastoralists who maintain these animals and depend on them for their livelihoods
- Full economic and ecosystem value of indigenous livestock should be paid. For example, Access and Benefit Sharing (ABS) mechanisms should be established, led by the National Biodiversity Authority, for commercial use of indigenous animal genetic resources. Similarly, a Payment for Ecosystem Services (PES) mechanism should also be explored, to financially compensate livestock keepers and their animals for their wider ecosystem contribution
- Need for creating market linkages and value addition facilities for breed specific products. For example, Dangi cattle milk is used to prepare a famous peda, Chilika buffalo curd keeps for four to five days without refrigeration, and Halari donkey milk is valued for its medicinal properties

Thank you!