Performance Recording in Bovines under the small holders dairy production system in India - *Challenges & suitable interventions*

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ICAR Conference 2023, Toledo, Spain, May 21-26, 2023
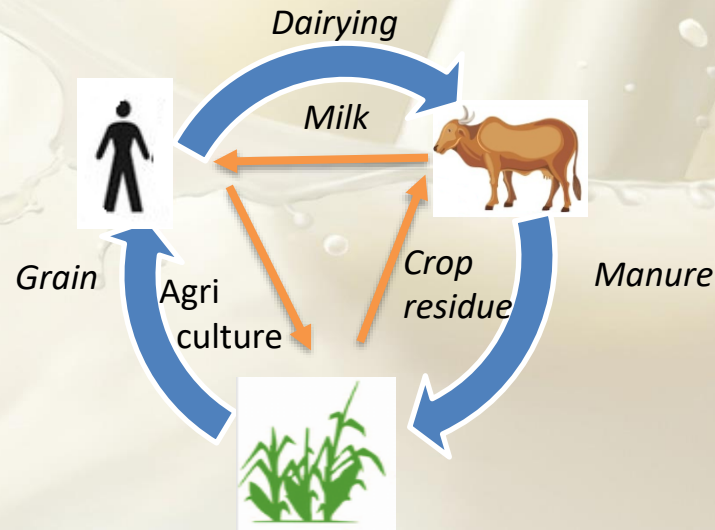
Dairying in India – Unique features

- Dairying in India is a livelihood, a vital economic activity for the upliftment of the rural milk producers

- It contributed about 66% value of the output of the livestock sector

- Milk remains the single largest agricultural commodity with a value of US$125.42 billion

- India has highest number of bovines in the world -302 million of which 190 millions are cattle (13% of world cattle) and 110 million buffaloes (54% of buffalo population)

- With 53 well defined breeds of cattle and 20 breeds of buffaloes – blessed with a large repository of bovine population with rich biodiversity

- These breeds survive harsh climatic conditions and resistant to many diseases
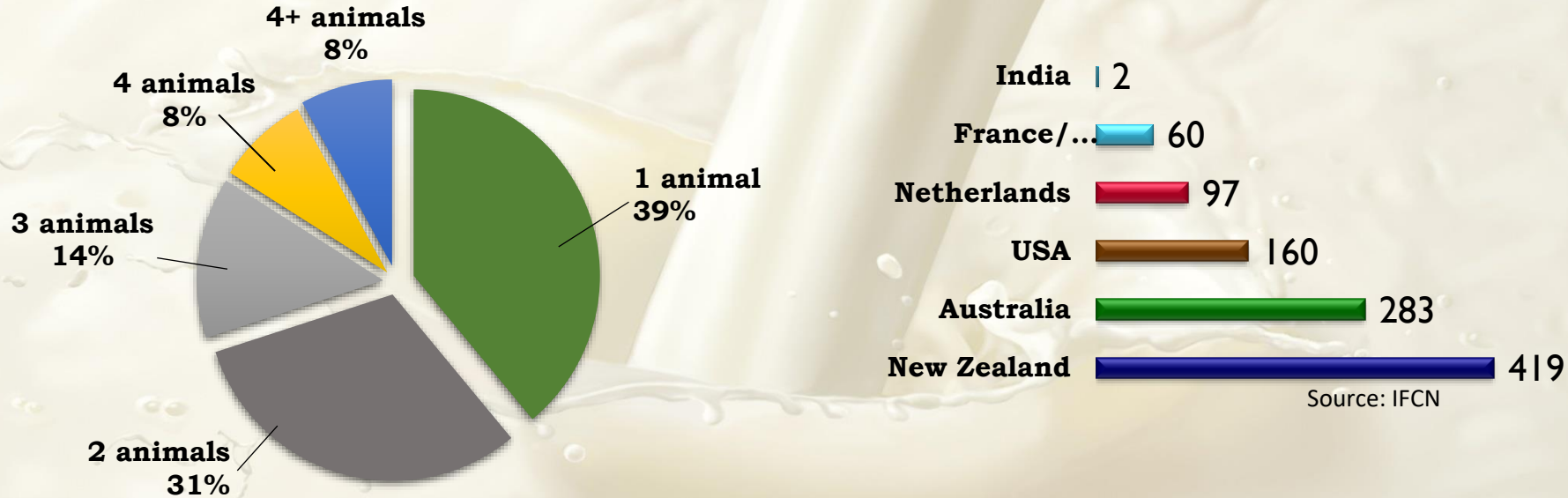
- Dairying is practiced along with Agriculture – as mixed production system

- Livestock are fed with the by-products of the crop – providing an avenue for effective utilization of crop residues

- Dairying has emerged as a perfect model of the circular economy

- More than 70% of the dairy farmers keep 1-2 animals in their herd

Pie chart:
- 1 animal 39%
- 2 animals 31%
- 3 animals 14%
- 4 animals 8%
- 4+ animals 8%

Bar chart:
- India 2
- France/... 60
- Netherlands 97
- USA 160
- Australia 283
- New Zealand 419

Source: IFCN

- Largest producer of milk with **221.06 million tonnes (2021-22)**

- Milk production in India involves millions of small milk producers, who are scattered across thousand of villages

- *" **Production by masses not the mass production**"* - an unique characteristics of Indian dairying

Mode of Transportation of Milk from Village to Dairy Plant

Challenges in implementing field performance recording system

- Smaller herd size
- Scattered villages
- Lack of awareness among the farmer about the importance of performance recording

Challenges in implementing field performance recording system

- Animal Identification

- Involvement of multiple agencies

- Logistics issues in collecting milk samples for component analysis

- Lack of facilities for milk component analysis

- Challenging local environment

- Free trade and transport of animals

- **Dairy Herd Improvement Programme Actions – DIPA :** During late 80's NDDB initiated comprehensive programmes of milk recording and genetic evaluation of animals in selected districts of Gujarat , Karnataka and Tamil Nadu state.

- **Since 2008:**

Period	No. of Projects	Breed covered	Name of Breeds	No. of animals milk recorded	No. of milk records (million)
2008-2012 (Pre NDP)	9	7	*Cattle*: HF, HF cross, Jersey cross, Rathi, Kankrej *Buffalo*: Murrah, Mehsana	**28133**	**0.22**
2012-2019 (NDP-I)	23	14	*Cattle*: HF, HF cross, Jersey cross, Rathi, Kankrej, Gir, Tharparkar, Sahiwal, Hariana *Buffalo*: Murrah, Mehsana, Nili Ravi, Pandharpuri, Jaffarabadi	**395345**	**3.44**
2019 Onwards (RGM)	23	16	*Cattle*: Gir, Sahiwal, Jersey, HF cross, Jersey cross, Rathi, Kankrej, Tharparkar, Hariana , Gaolao *Buffalo*: Murrah, Mehsana, Nili Ravi, Pandharpuri, Jaffarabadi, Banni	**265300**	**2.54**

Traits Measured

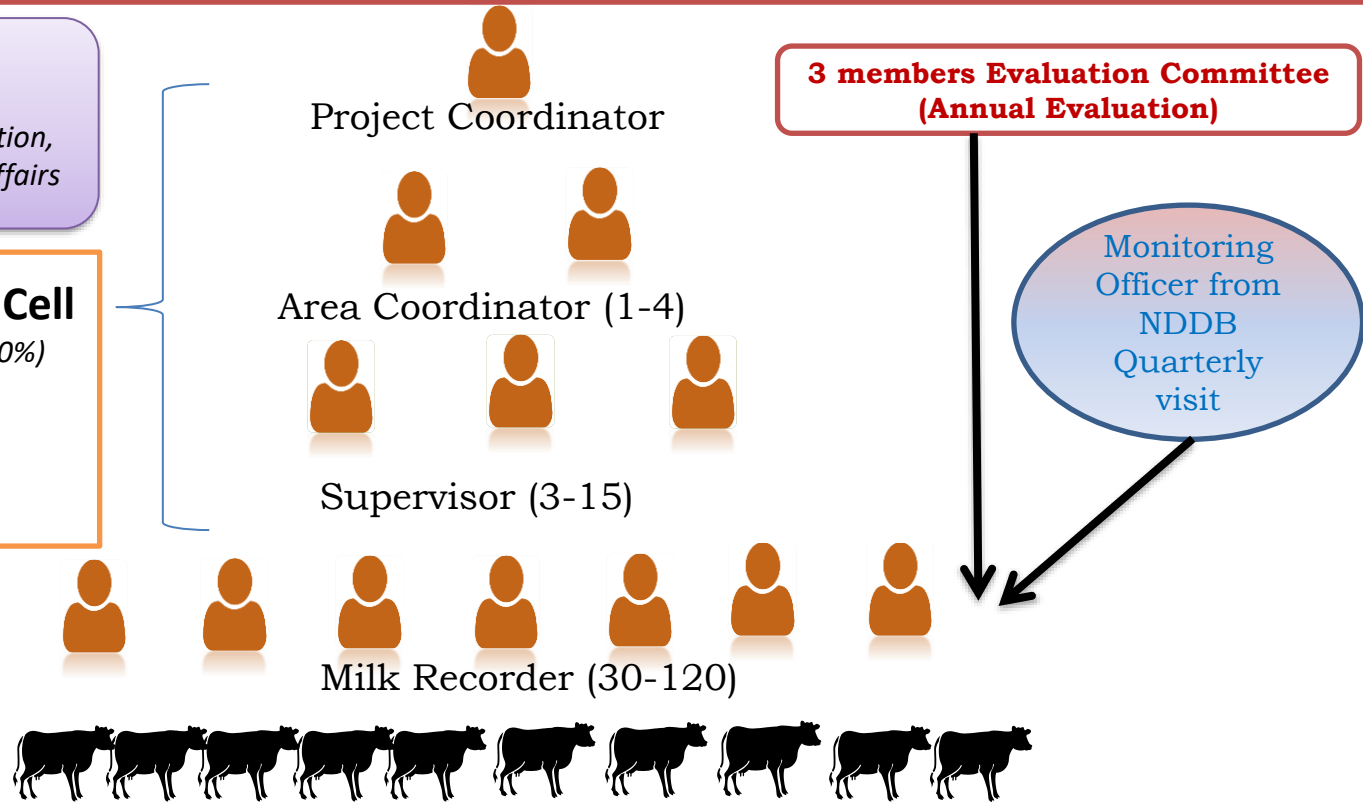| Production Traits	Reproduction Traits	Type Traits	
Test day yield	Age at First AI	Stature	Fore Udder Attachment
305 day yield	Age at First Calving	Heart Girth	Rear Udder Height
Test day fat %	No. of AIs per conception – heifers and cows	Body Length	Central Ligament
Test day fat yield	Bull conception rate	Body Depth	Udder Depth
305 day fat %	Service period for cows	Angularity	Front Teat Placement
305 day fat yield	Inter-calving period	Rump Angle	Teat Length
Protein, Lactose and SNF %	Calving Ease	Rump Width	Rear Teat Placement
Protein test day yield		Rear Leg Set	Rear Udder Width
Protein 305 day yield		Rear Leg Rear View	Teat Thickness
		Foot Angle	Body Condition Score

Interventions

A. Institutional arrangements for supervision of performance recoding

Project Management Committee
(for general superintendence, direction, control & management of project affairs &activities)

Project Implementation Cell
- *Surprise check of milk records (10%)*
- *Validation of milk records(10%)*
- *AI follow-up*
- *Type classification*
- *Growth measurement*

Project Coordinator

Area Coordinator (1-4)

Supervisor (3-15)

Milk Recorder (30-120)

3 members Evaluation Committee (Annual Evaluation)

Monitoring Officer from NDDB Quarterly visit

MR cover 1-2 villages; No. of animals recorded/ month/recorder: 50-90;
Incentives to MR for milk recording $15/ animal for 10 TDR ; Incentives to farmer: $ 6- $12/animal (on completion of 10 TDMR)

B. Animal Identification

- A Unique 12 Digit Barcoded Ear Tag to identify, register and track each Animal

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Biometric identification through muzzle map
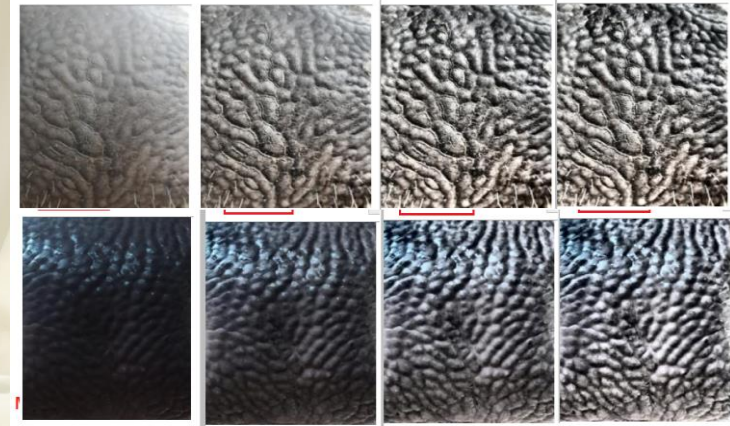
C. Online Data recording through

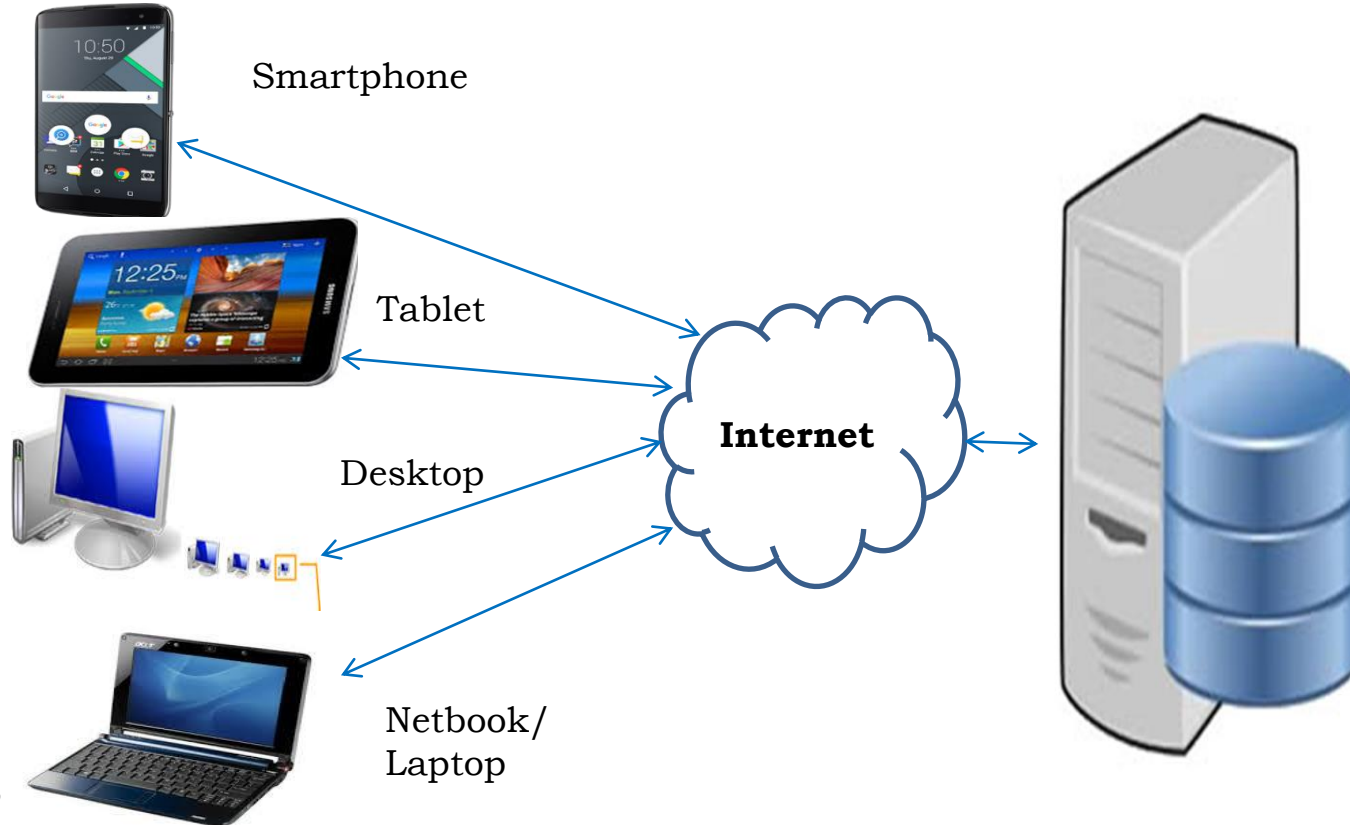**Information Network for Animal Productivity & Health**

(INAPH)
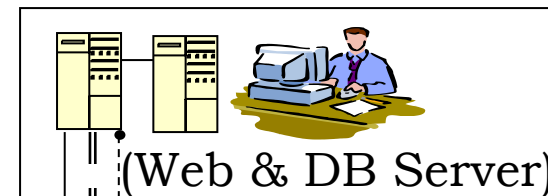
Hardware and different platforms

Clients

Servers

Smartphone

Tablet

Desktop

Internet

Netbook/
Laptop

D.Milk recording through Smart Weighing Scale

Amritsar, Punjab, India
Longitude 74.8896° E Latitude 31.5177° N
11° C
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65 no. of Milk testing Labs equipped with milk component analyzers have been established for milk component analysis (Fat, Protein, SNF, Lactose) at project level

Recording:

Monthly milk sample on the day of milk recording

Milk sample testing at labs at project level

Traits:

Test day fat %
Test day fat yield
305 day fat %
305 day fat yield
Protein, Lactose and SNF %
Protein test day yield
Protein 305 day yield

Milk-o-bike

F.Type Traits measuring devices

G.Dairy Surveyor App – for monitoring Field activities
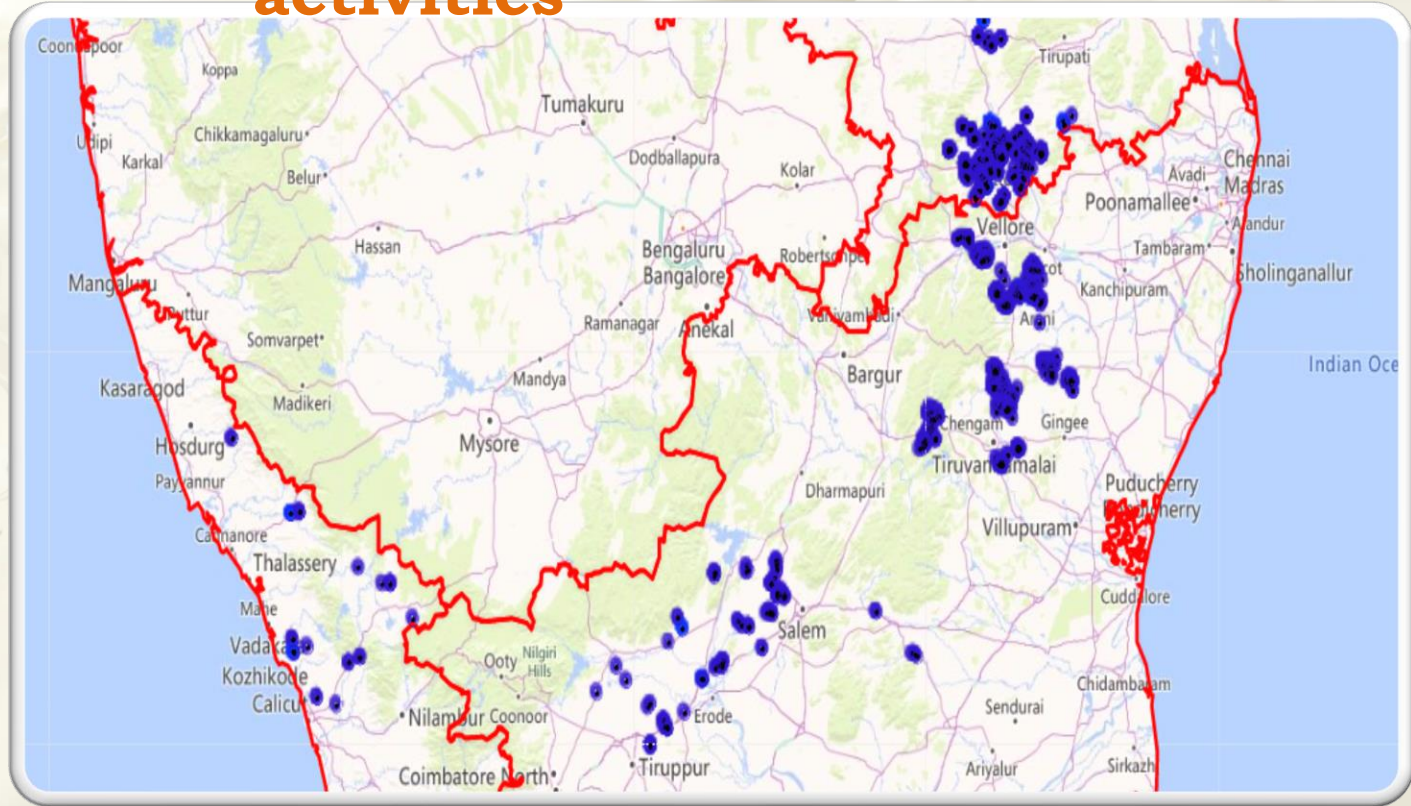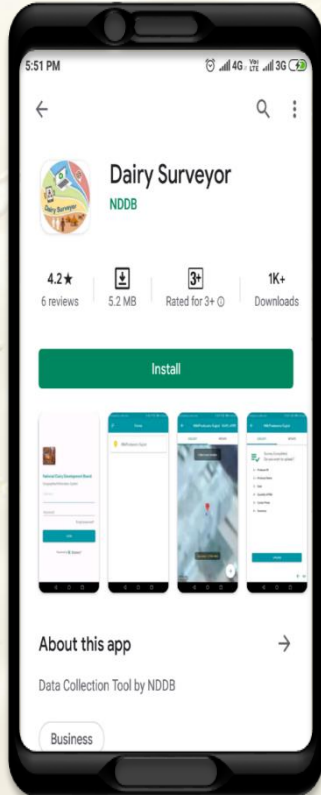
Outcome

1. Creation of a huge volume of national database

Species	Milk Records (million)	Fat Records (million)	Protein Records (million)	Lactose Records (million)	SNF Records (million)	Animal Typed
Cattle	3.41	2.17	1.91	1.62	2.25	17388
Buffalo	2.64	1.50	1.19	0.97	1.28	8895
Total	**6.06**	**3.68**	**3.10**	**2.60**	**3.53**	**26283**

2. Implementation of Genomic selection using recorded female reference population

- Development of customized medium density genotyping chip – **INDUSCHIP** (*for cattle*) and **BUFFCHIP** (*for buffaloes*)

- Creation of reference population major dairy breeds of cattle and buffaloes

- Selection of young bulls on the basis of **Genomic Breeding values (GBV)**

Category	No. of Samples in repository	No. of Samples genotyped
Cattle	82609	31207
Buffalo	50326	16447
Total	**132935**	**47654**

3. **Identification of champion cattle & buffaloes of various breeds in the breeding tracts**

4. **Capacity Building : Developed a pool of trained professionals to manage complex Progeny Testing programs, proficiency in handling & analysis of genotyping data**

5. **Higher market value of the performance recorded animals motivated farmers and ensured their active participation**

6. **Development of a successful model for field performance recording under the smallholder production system in India**

7. **Govt. of India approved "National Milk Recording Programme" with an aim to record 1 million animals engaging ~75000 trained milk recorders**
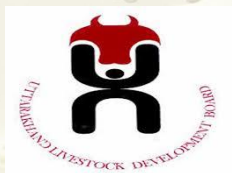
Future Aim

- Inclusion of various new traits for performance recording

  - *Mastitis incidence*

  - *General Immune Response measurement*

  - *Methane emission measurement*

  - *Heat Stress*

  - *Temperament*

  - *Milkability*

- Index based selection of bulls combining economically important traits

- Integrating genomic selection with IVF to accelerate genetic progress

- Automated body type classification using computer vision

Thank You