



Invited Talk

in

**The 75th EAAP Annual Meeting
1-5 September 2024 - Florence, Italy**



EAAP
European Federation
of Animal Science



Climate Change and Livestock Production: Revisiting Strategies to Ensure Sustainable Livestock Farming Systems



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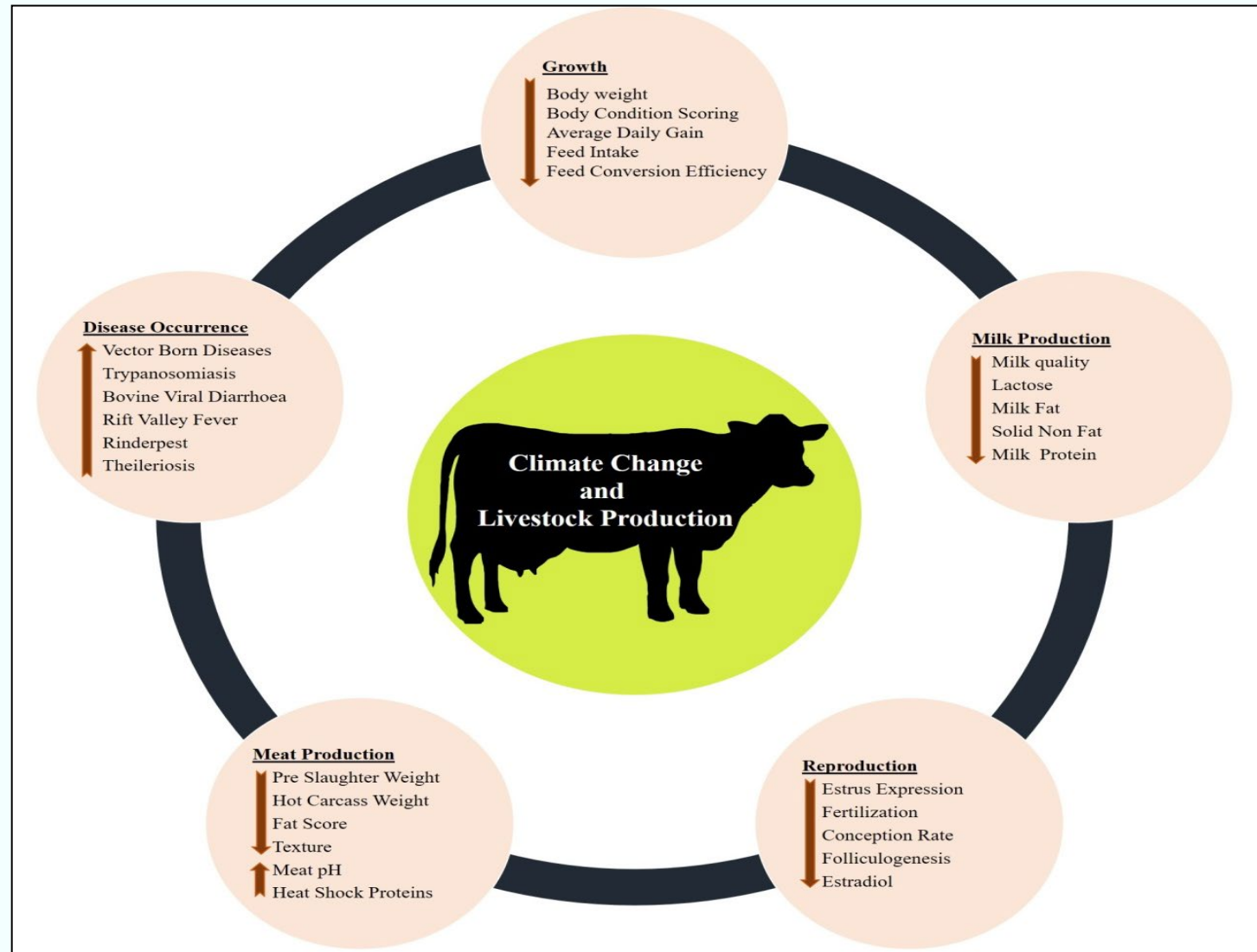
Plan of Talk

1. Concepts Associated with Climate Change Associated Livestock Production
2. Omics Approach to Identify Climate Resilient Animals
3. Different Biomarkers for Quantifying Heat Stress Response in Livestock
4. Application of Non-invasive Approaches for Assessing Heat Tolerance
5. Sensors and Artificial Intelligence Based Applications to Assess Stress Response in Animals
6. Different Strategies for Enteric Methane Mitigation
7. Strategies to Sustain Livestock Production in the Changing Climate Scenario
8. Integrated Farming for Doubling Farmers Income
9. Conclusion & Future Perspectives

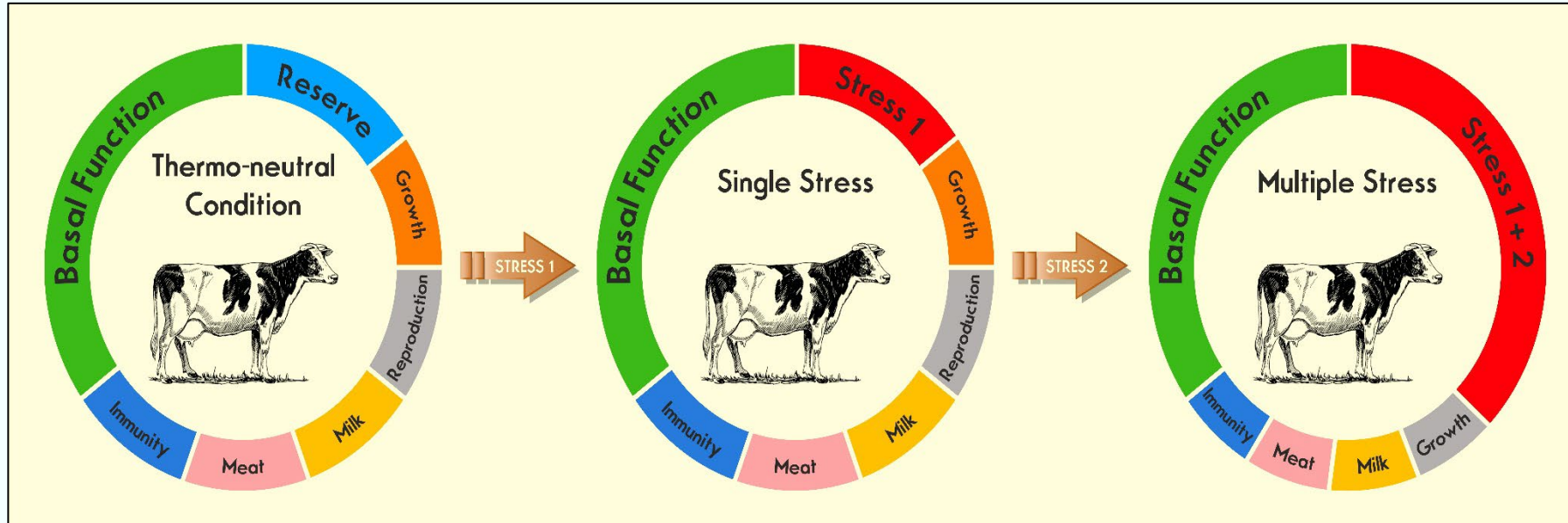
Concept 1

Concepts Associated with Climate Change Associated Livestock Production

Various Impacts of Climate Change on Livestock Production



Concept of Multiple Stressors in Cattle in the Changing Climate Scenario

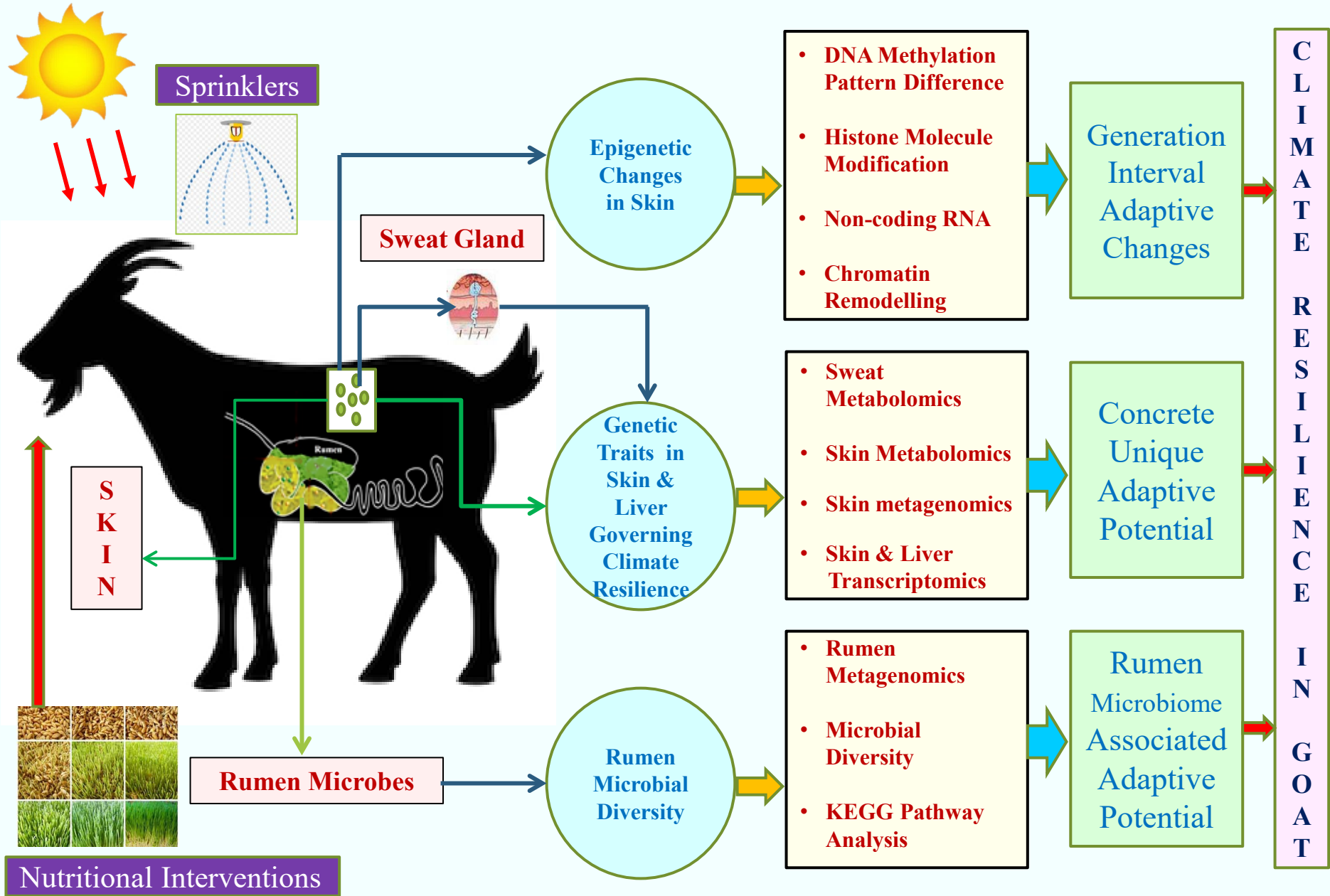


Sejian et al., 2012

Concept 2

Omics Approach to Identify Climate Resilient Animals

Establishing Climate Resilience in Goat Breeds



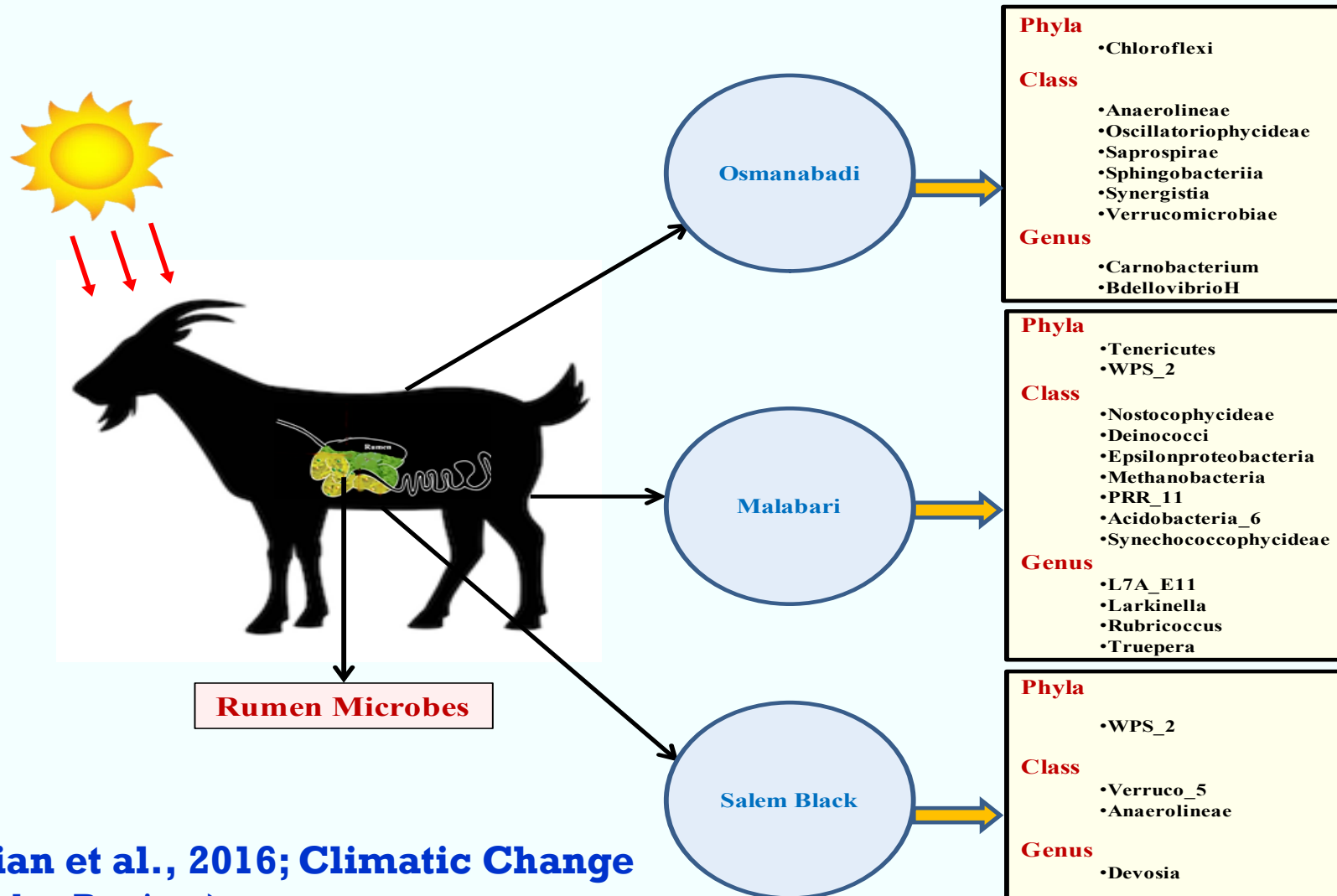
Concept 2.2

Whole Transcriptome Associated Adaptive Potential Assessment

Concept 2.3

Rumen Microbiome Associated Adaptive Potential Assessment in Goat

Heat Stress Associated Changes in Rumen Microbial Abundance at Different Taxonomic Level in Three Indigenous Goat Breeds



Sejian et al., 2016; Climatic Change (Under Review)

Concept 2.6

Epigenetic Changes Studies to Identify Climate Resilience in Animals

(Bisulfite Sequencing to Assess DNA Methylation Patterns)

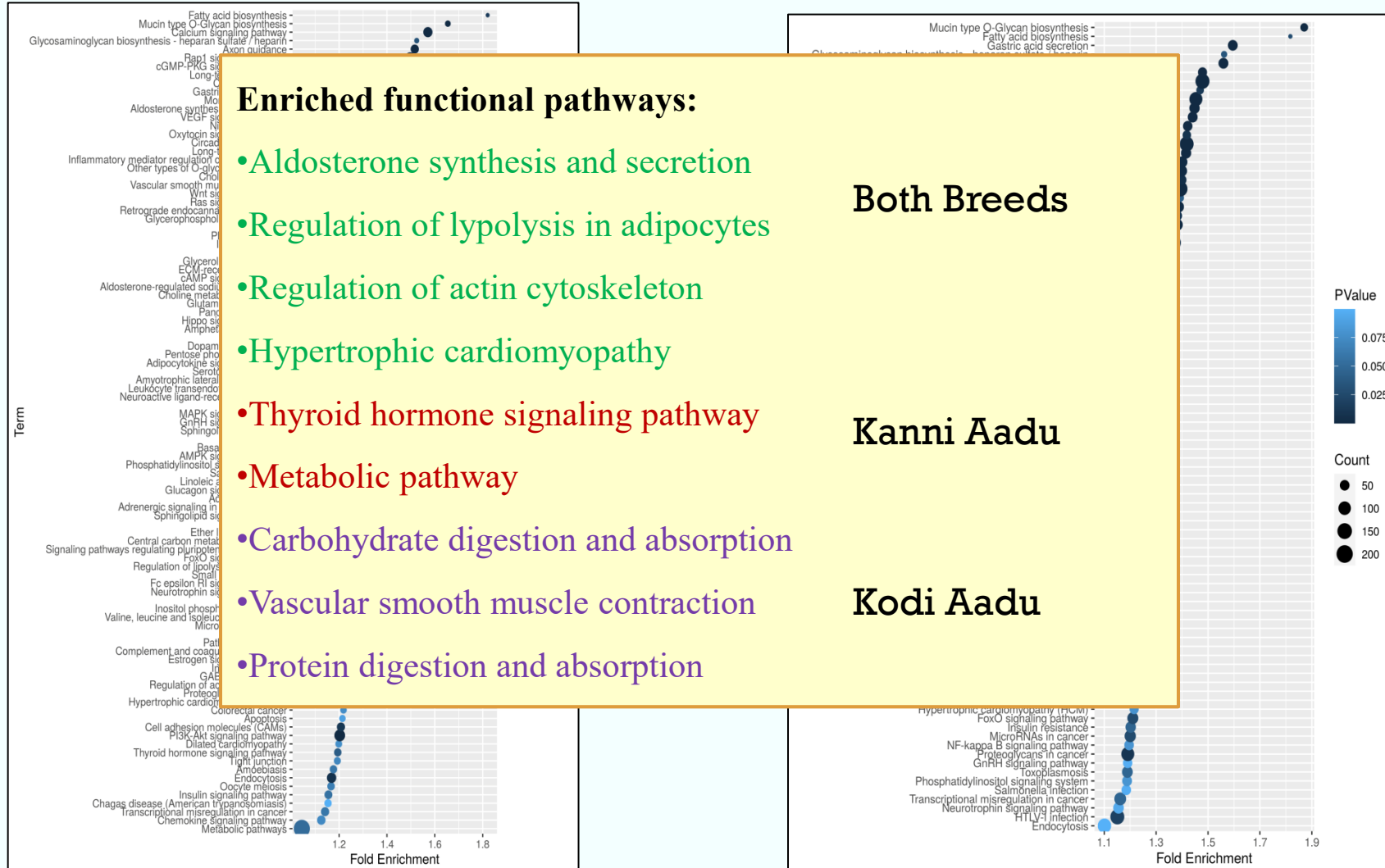
Differential Methylation Analysis in Different Regions in the Genome

Differential Methylated Regions (DMRs)						
	mCpG		mCHG		mCHH	
	Hypo-methylated	Hyper-methylated	Hypo-methylated	Hyper-methylated	Hypo-methylated	Hyper-methylated
KAC_vs_KAH	25375	25170	4	3	3	5
KOC_vs_KOH	20902	19567	84	80	5	10
Differential Methylated Genes (DMGs)						
KAC_vs_KAH	23102	23188	3	3	1	3
KOC_vs_KOH	19133	18092	53	54	4	8

KEGG-Stress Pathways at MCpG Region in the Genome

KAC vs KAH

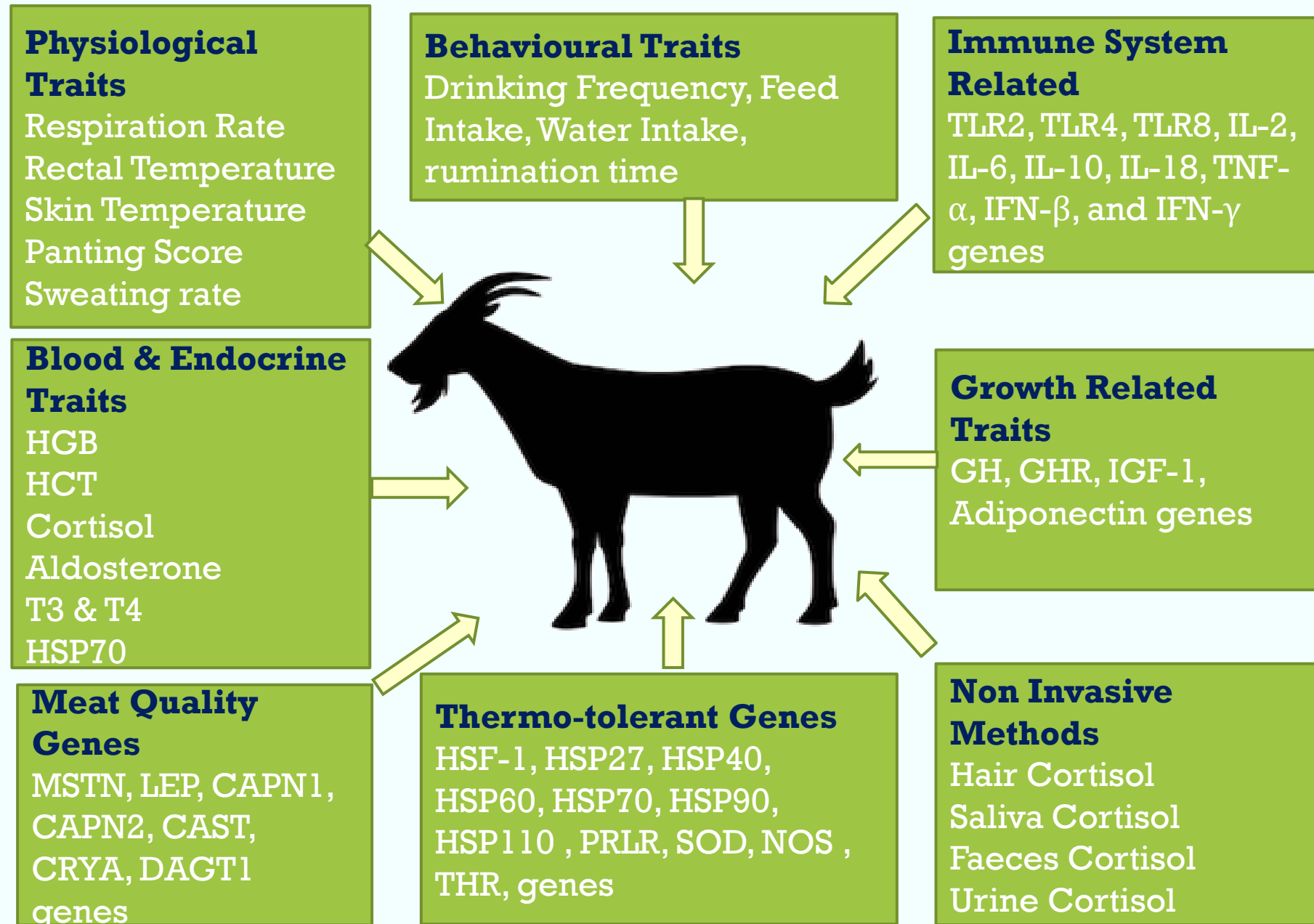
KOC vs KOH



Concept 3

Different Biomarkers for Quantifying Heat Stress Response in Livestock

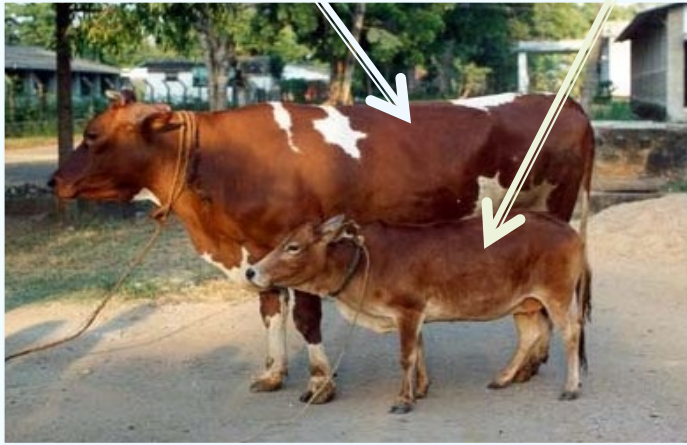
Association Analysis between THI and Phenotypic and Genotypic Traits



Conserving the Dwarf Cattle Breeds for Marker Assisted Selection

Crossbred cattle

World's smallest cattle breed – **Vechur Cattle**



Advantages of Dwarf Cattle Breeds

- ❖Extremely adapted
- ❖Low feed requirement
- ❖Less water requirement



Kasaragode Dwarf



Punganur Cattle

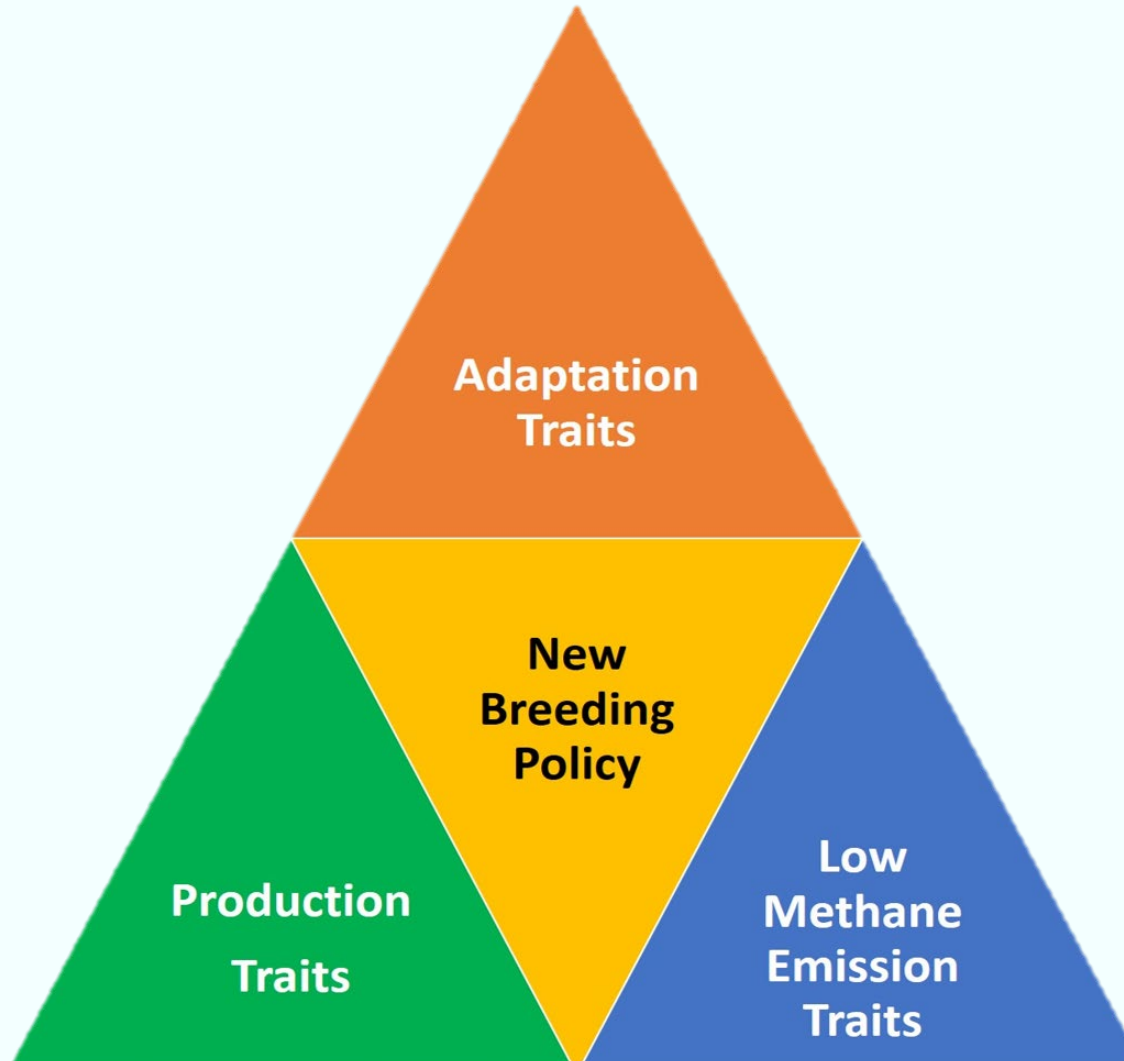


Vechur Cattle



Malnad Gidda Cattle

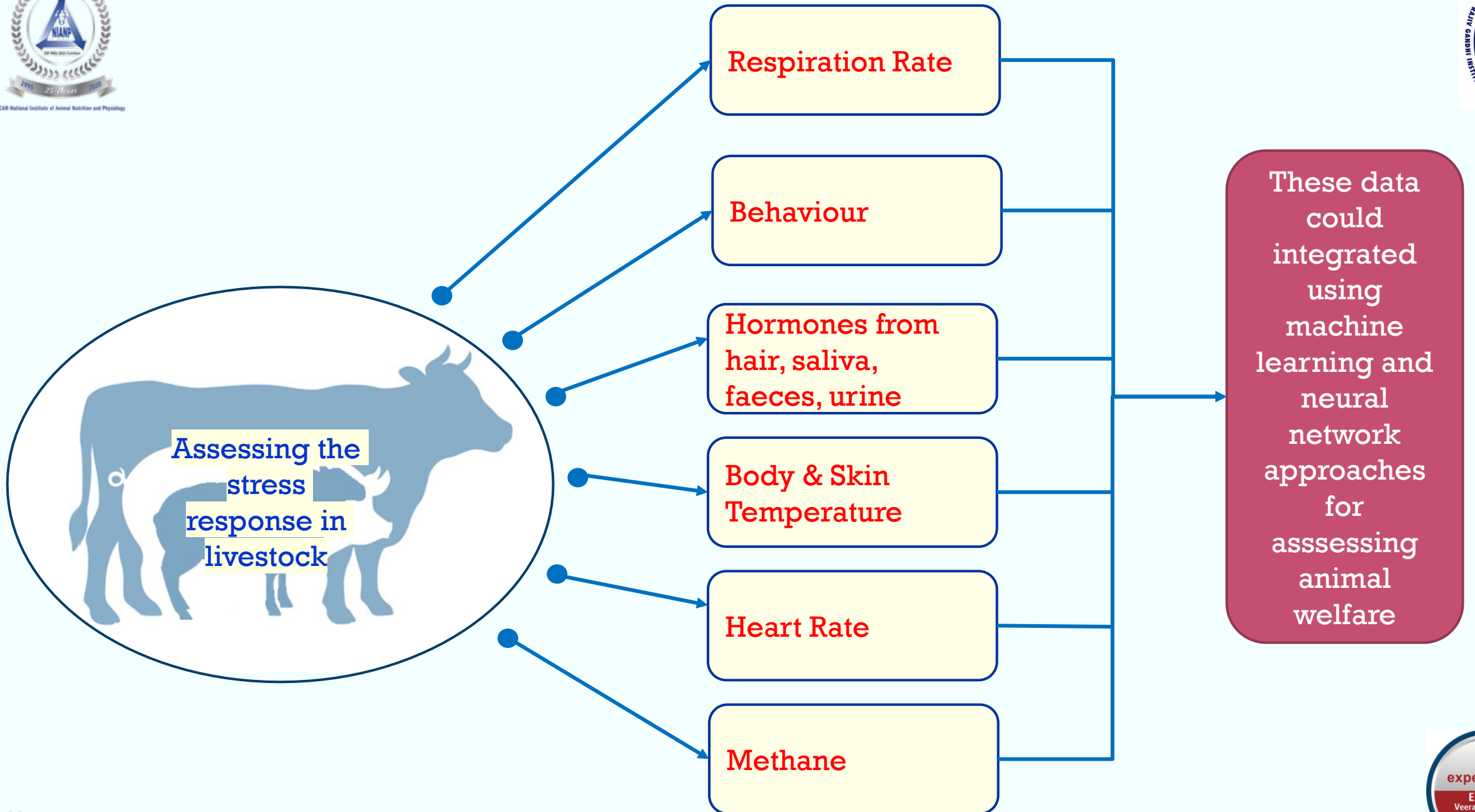
Projected Future Breeding Policy



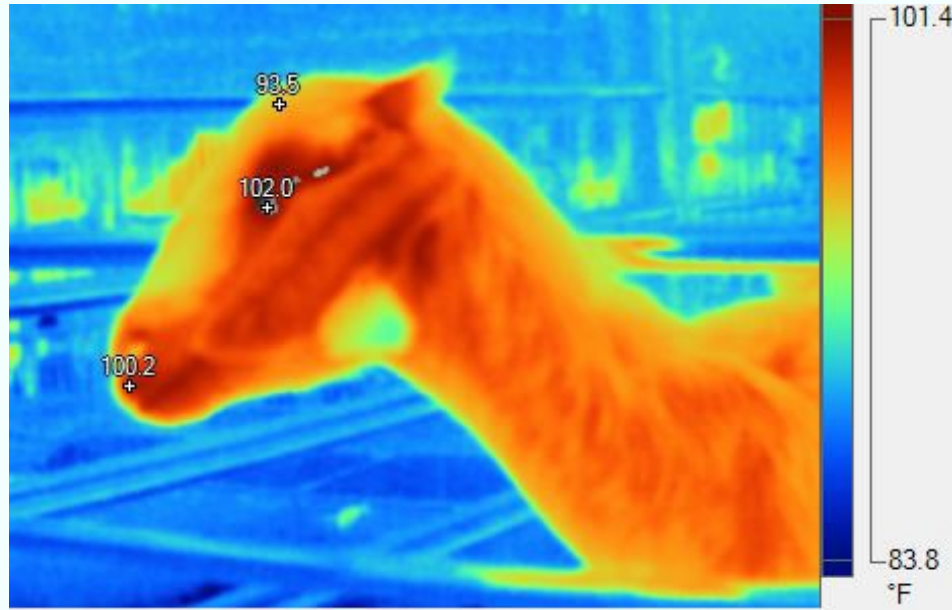
Sejian et al., 2022

Concept 4

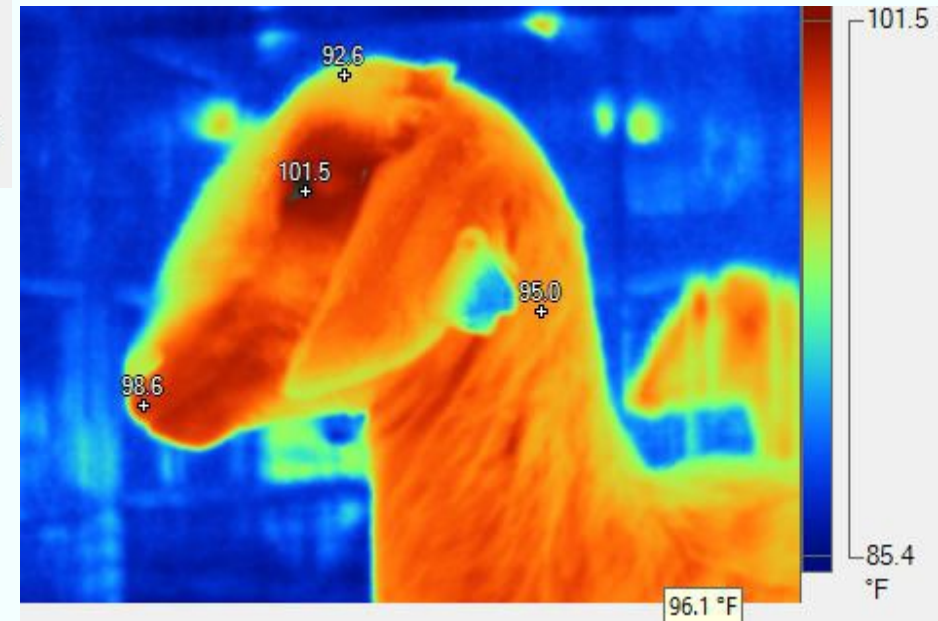
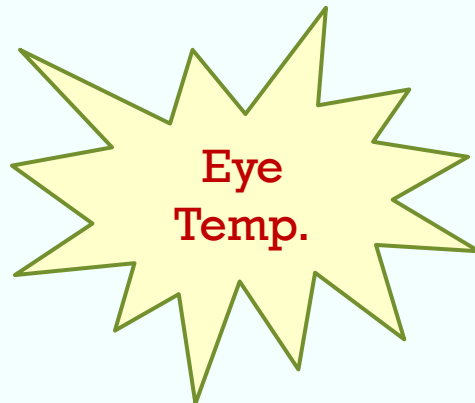
Application of Non-invasive Approaches for Assessing Heat Tolerance



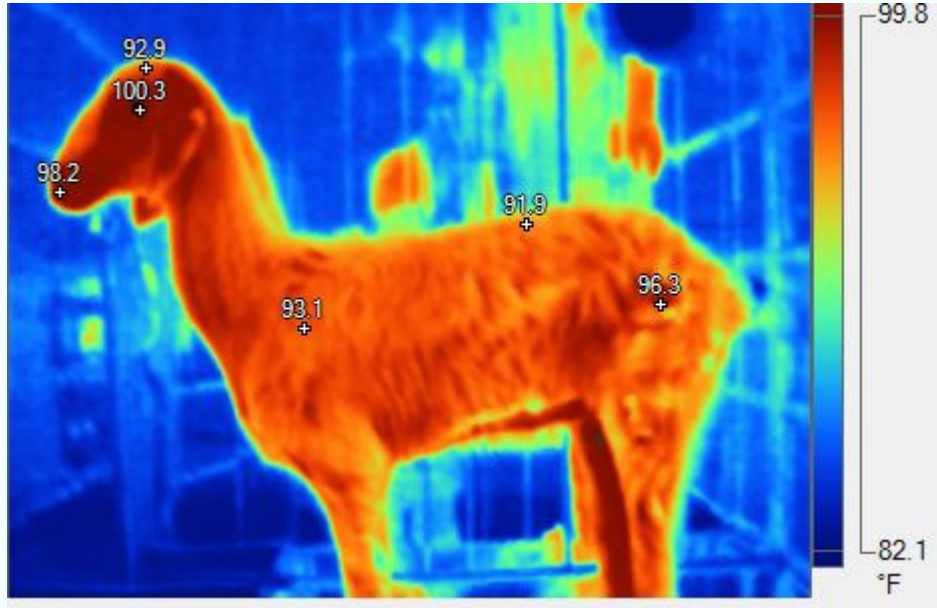
Infrared Thermal Imaging



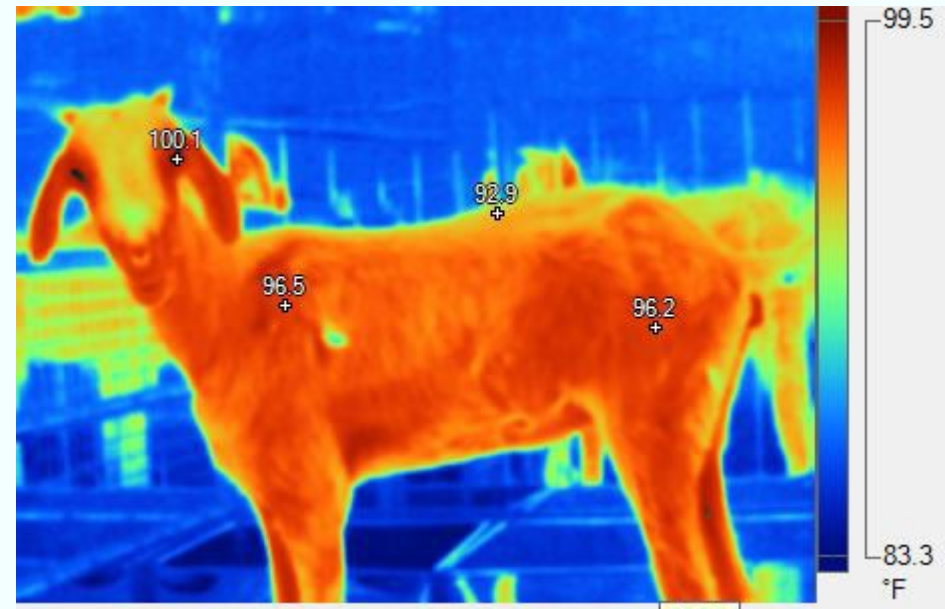
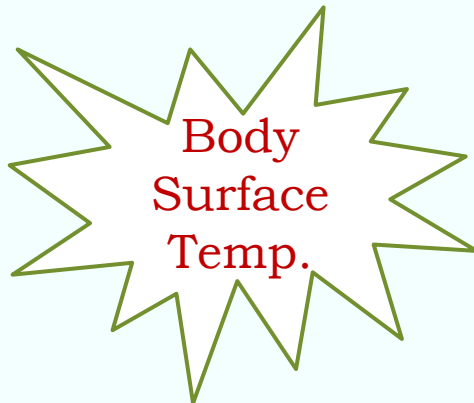
Kanni Aadu



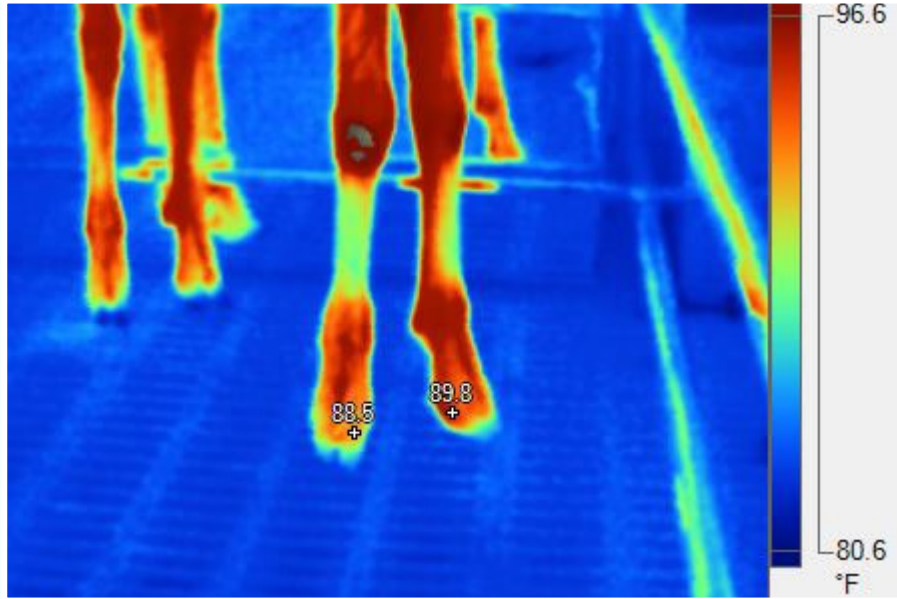
Kodi Aadu



Kanni Aadu



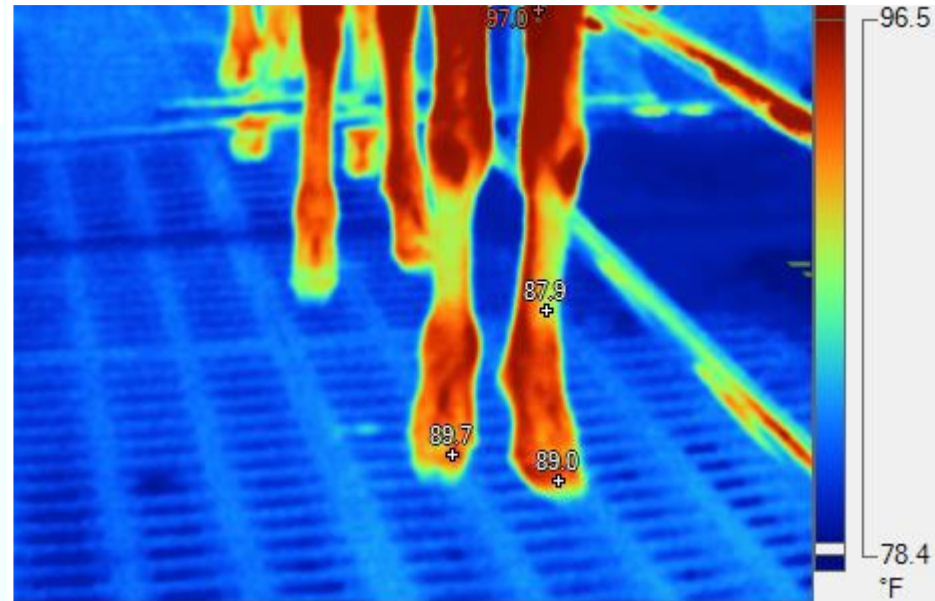
Kodi Aadu



Kanni Aadu



Kodi Aadu



Concept 4.3

Identification Agro-ecological Zone Specific Breeds Using Advanced Climate Chamber Facilities

Centre for Climate Resilient Animal Adaptation Studies



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Advanced Climate Chamber Facilities



Identification Agro-ecological Zone Specific Breeds



Salem Black



Malabari



Osmanabadi



Kodi aadu



Kanni Aadu



Nandidurga



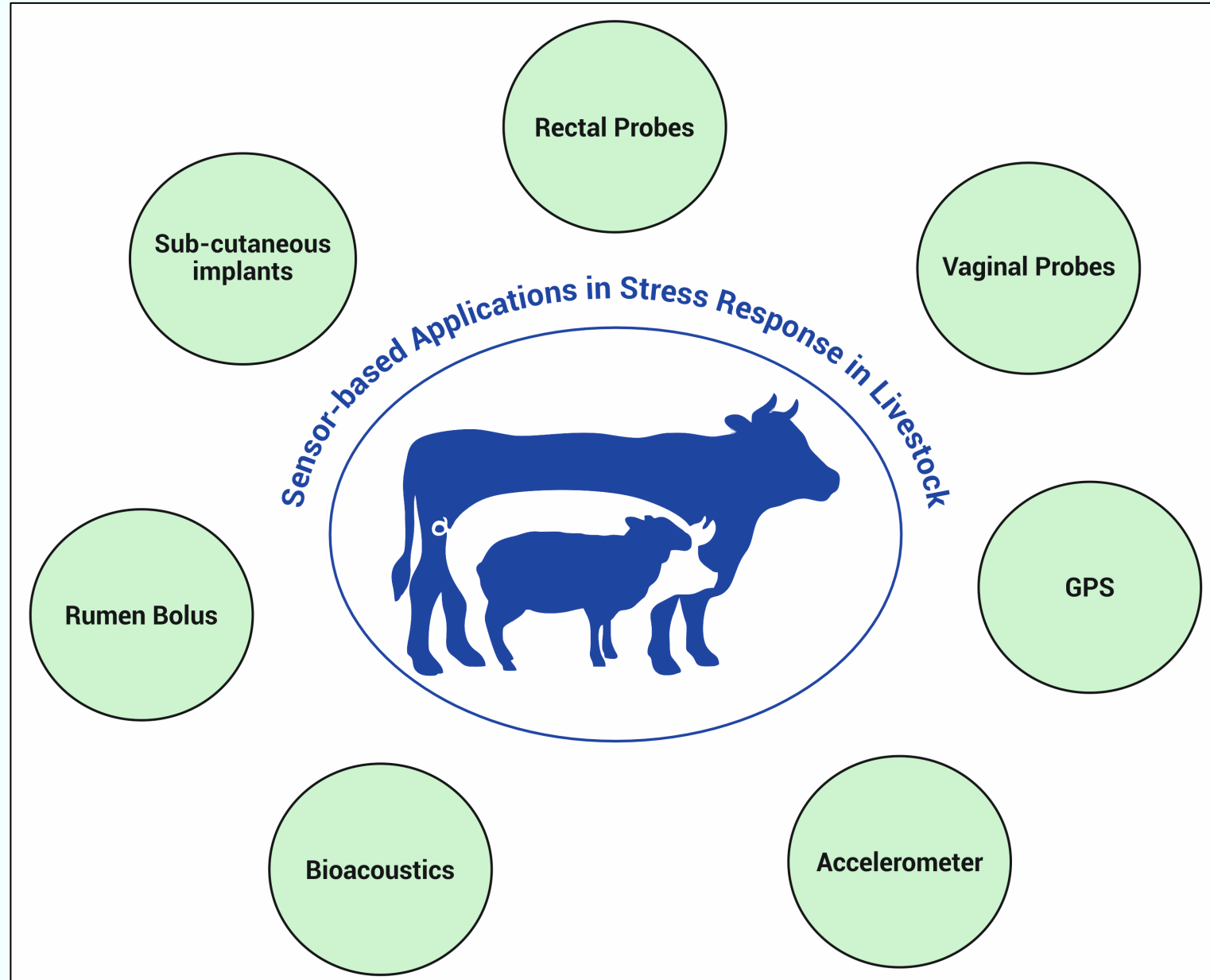
Bidri

Excellent Climate Resilience

Showing Great Promise

Concept 5

Sensors and Artificial Intelligence Based Applications to Assess Stress Response in Animals

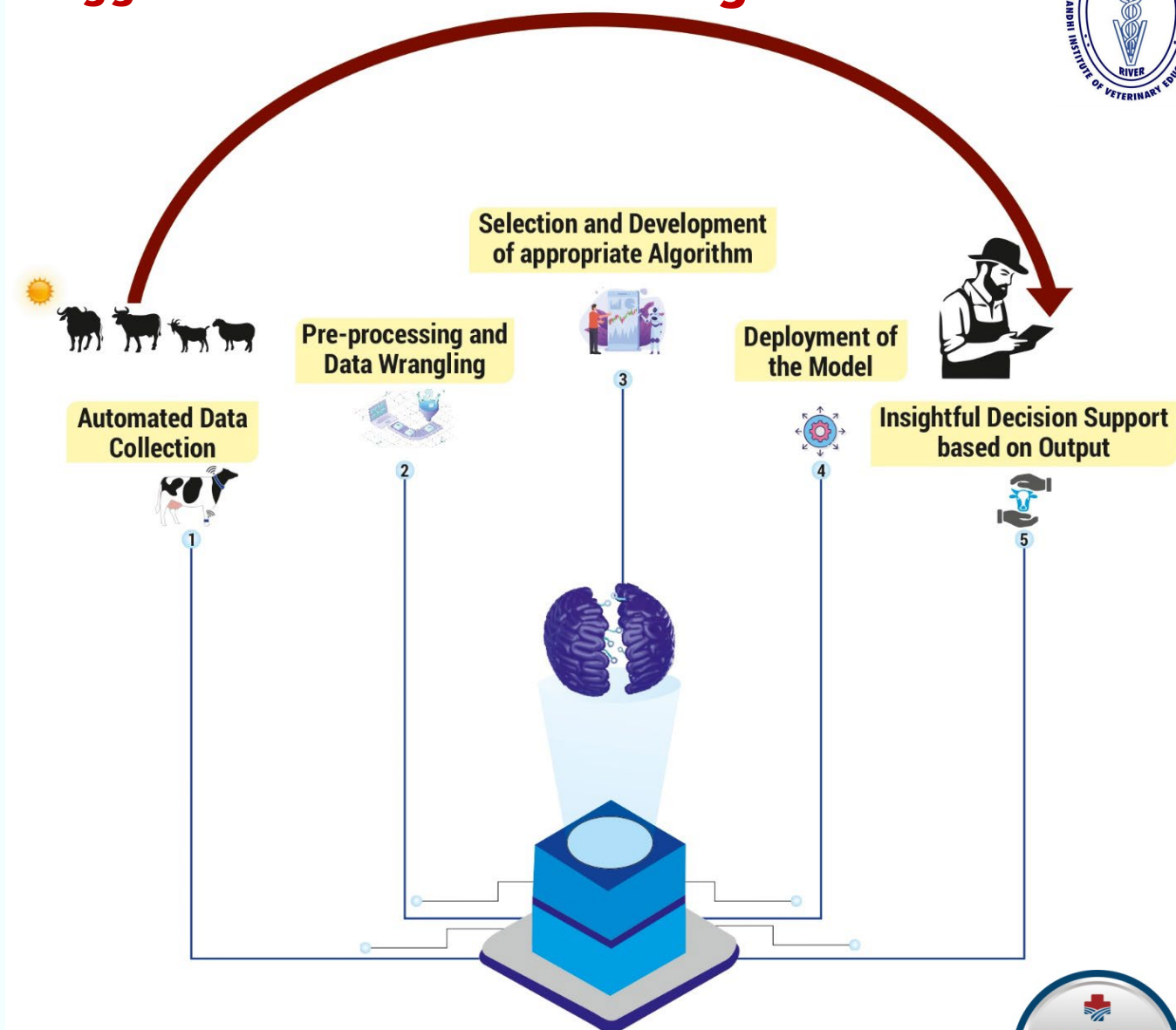
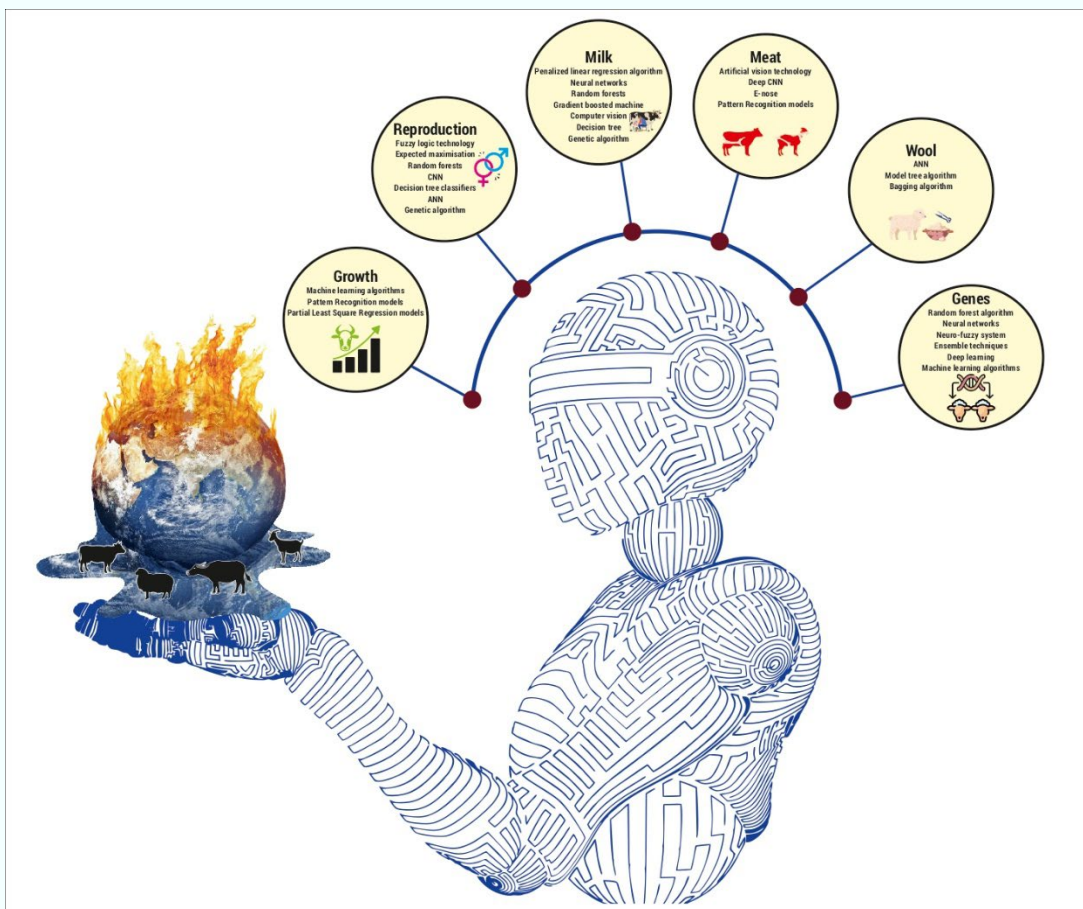


Rumen Boluses to Measure Rumen Temperature



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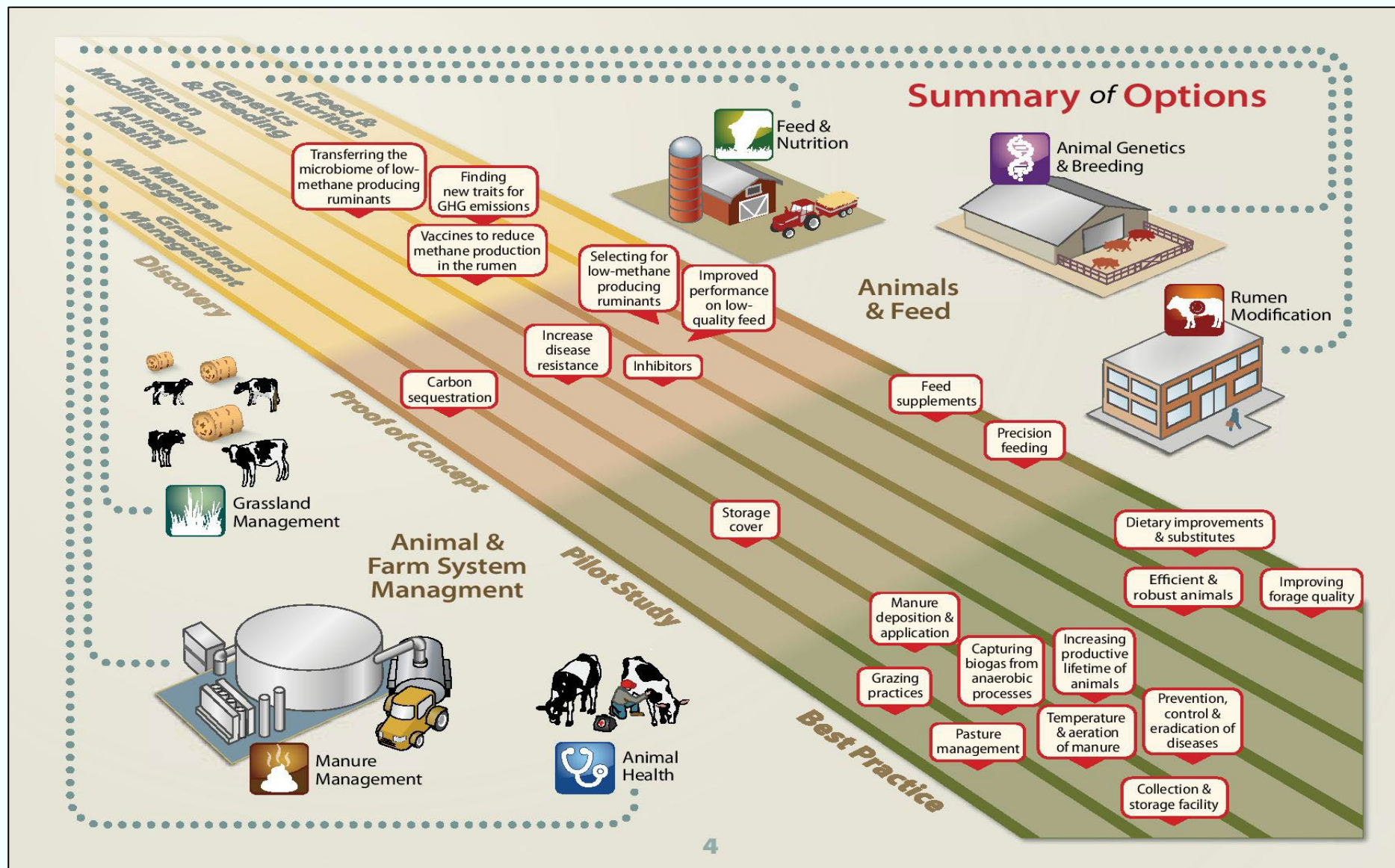
Application of Artificial Intelligence & Machine Learning



Concept 6

Different Strategies for Enteric Methane Mitigation

Different Options for Reducing Livestock Related GHGs

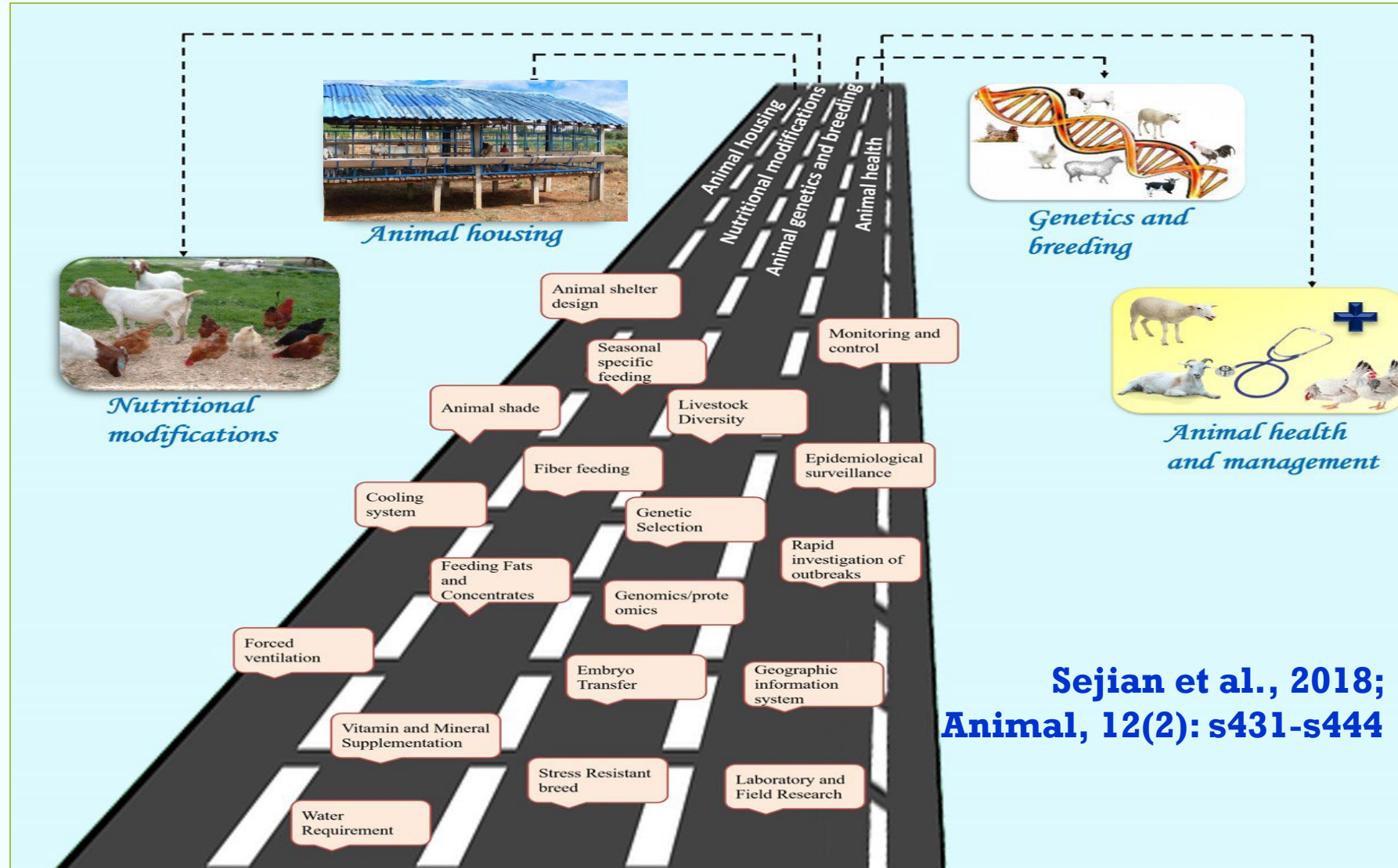


Brian Lindsay, 2014

Concept 7

Strategies to Sustain Livestock Production in the Changing Climate Scenario

Strategies to Sustain Goat Production in the Changing Climate Scenario



Concept 8

Integrated Farming for Doubling Farmers Income

Special Integrated Designs



Innovative integrated model with goat, rabbit, poultry and fodder production

Prasad et al., 2014

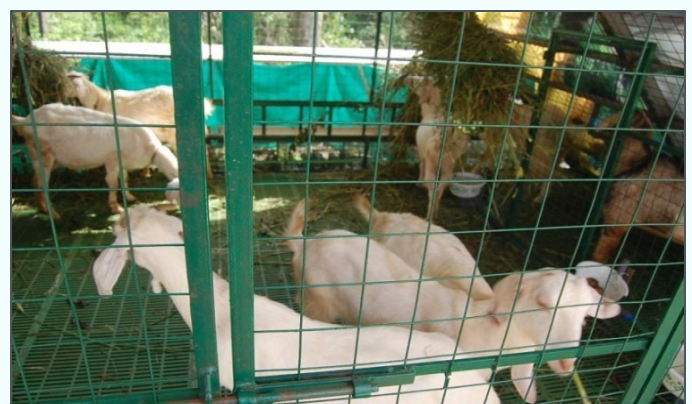
Azola Tank



Grower Unit



Goat Unit



Layer Unit



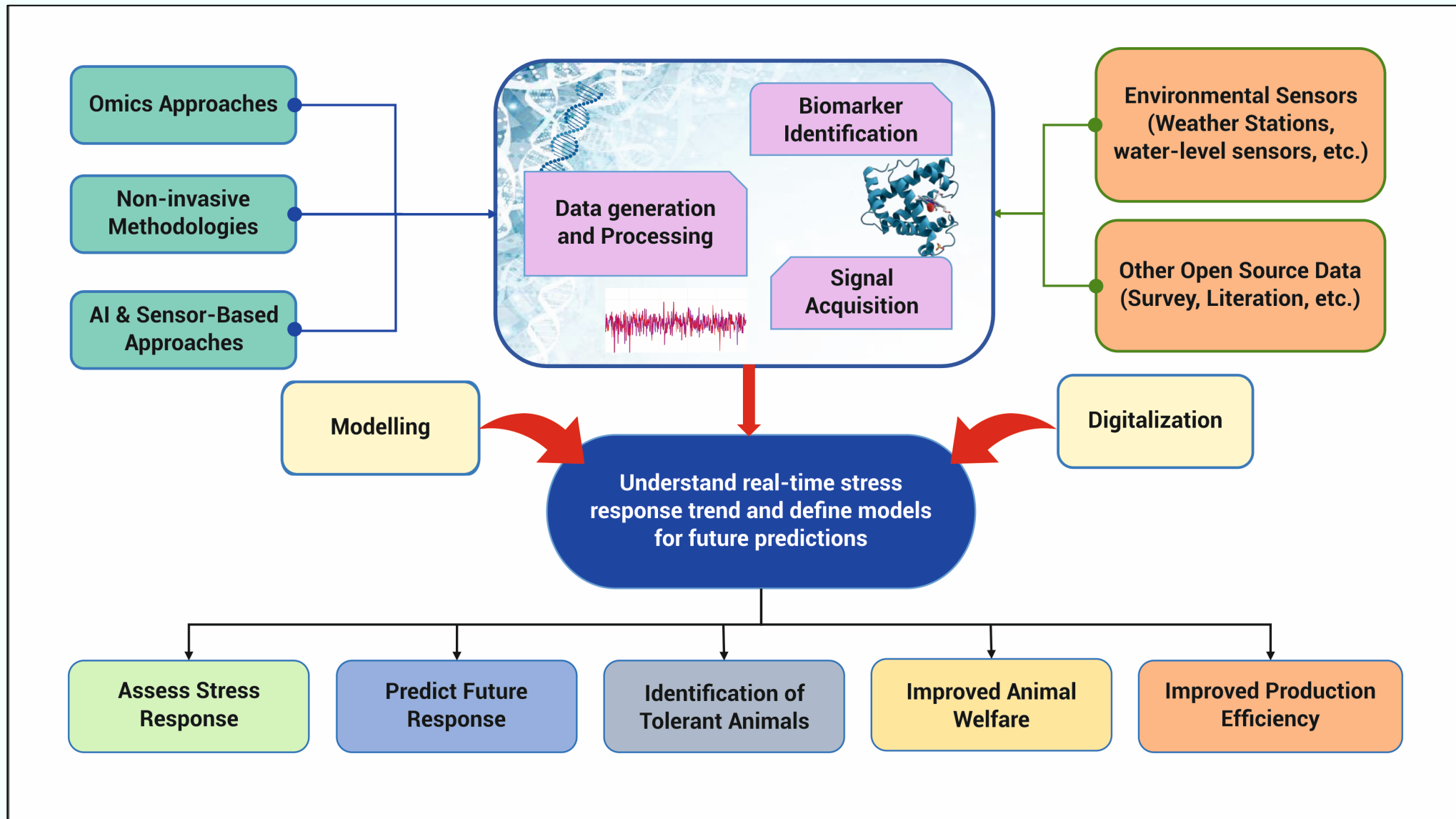
Rabbit Unit



Fodder Production



Conclusion



Water Resource
Management

Advanced Thermal Indices

Interrelationship between
Soil, Climate & Livestock

Genetic Selection &
Breeding Management

Promoting Goat as Ideal
Climate Resilient Species

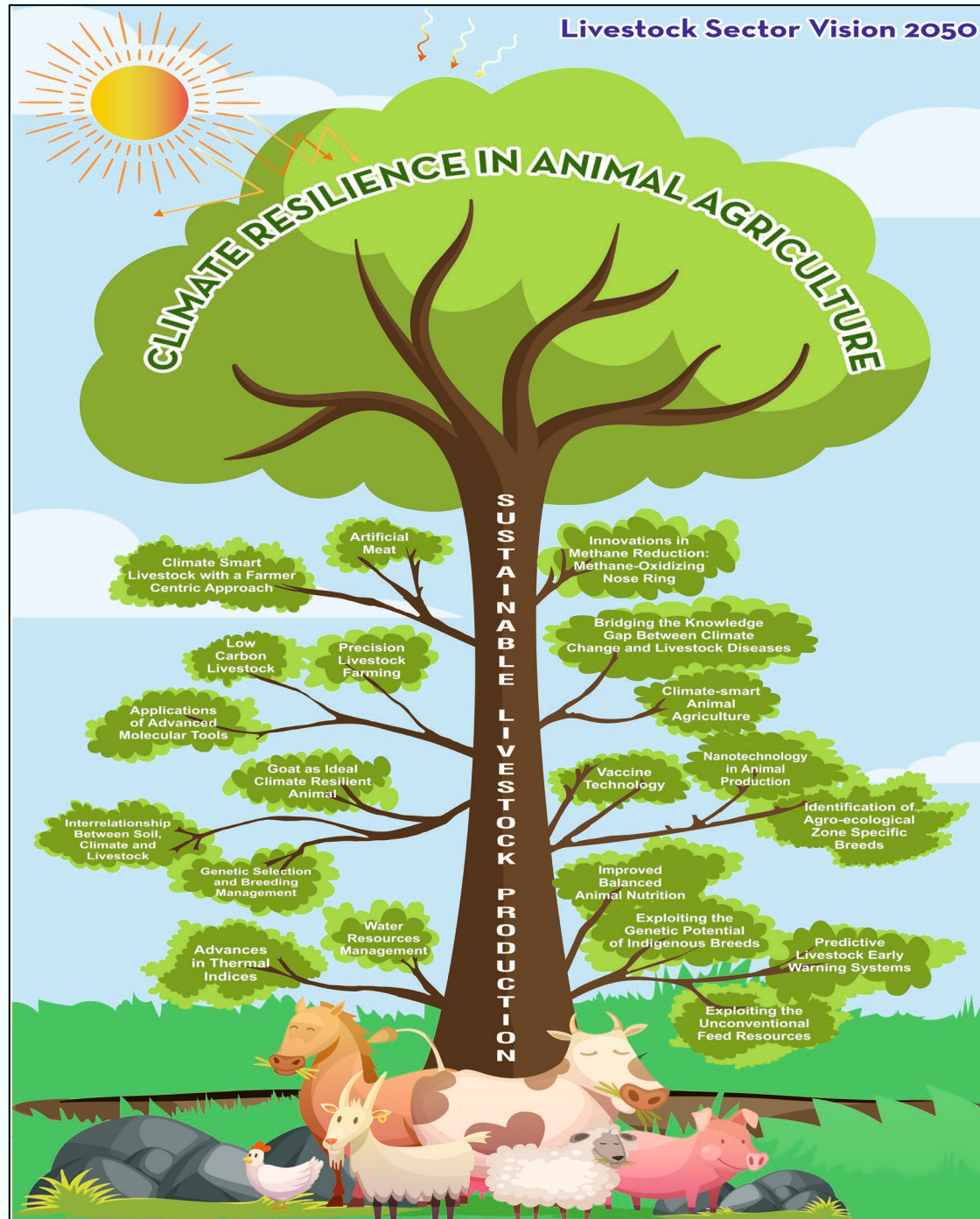
Applications of Advanced
Molecular Tools

Precision Livestock Farming

Climate Smart Livestock with
a Farmer Centric Approach

Low Carbon Livestock

Artificial Meat



Exploiting the
Unconventional Feed
Resources

Predictive Livestock Early
Warning Systems

Exploiting the Genetic
Potential of Indigenous
Breeds

Improved Balanced Nutrition

Identification of Agro-
ecological Zone Specific
Breeds

Nano & Vaccine technology
in Animal Production

Bridging the knowledge
Gap between Climate
Change & Livestock
Diseases

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Dr. Ruban



Dr. M. Reddy



Dr. Devaraj



Dr. Silpa



Ms. Reshma



Ms. Aleena



Ms. Archana



Ms. Pragna



Mr. Shashank



Ms. Rasha



Dr. Spandan



Mr. Afsal



Ms. Shilja



Ms. Vandana



Ms. Devapriya

Thanks



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