



International Journal of Veterinary Sciences and Animal Husbandry



ISSN: 2456-2912

NAAS Rating (2026): 4.61

VET 2025; SP-11(4): 80-83

© 2026 VET

www.veterinarypaper.com

Received: 11-01-2026

Accepted: 15-02-2026

Meet K Pandya

Post-Graduate Scholar,
Department of Veterinary
Medicine, College of Veterinary
Science and Animal Husbandry
Kamdhenu University,
Junagadh, Gujarat, India

Suresh V Mavadiya

Assistant Professor, Livestock
Farm Complex, College of
Veterinary Science and Animal
Husbandry Kamdhenu
University, Junagadh, Gujarat,
India

Arshi A Vagh

Professor & Head, Department
of Veterinary Medicine, College
of Veterinary Science and
Animal Husbandry Kamdhenu
University, Junagadh, Gujarat,
India

Avinash K Bilwal

Assistant Professor, Department
of Veterinary Medicine, College
of Veterinary Science and
Animal Husbandry Kamdhenu
University, Junagadh, Gujarat,
India

Shruti H Inamdar

Post-Graduate Scholar,
Department of Veterinary
Medicine, College of Veterinary
Science and Animal Husbandry
Kamdhenu University,
Junagadh, Gujarat, India

Corresponding Author:

Meet K Pandya

Post-Graduate Scholar,
Department of Veterinary
Medicine, College of Veterinary
Science and Animal Husbandry
Kamdhenu University,
Junagadh, Gujarat, India

Application of artificial intelligence in animal disease diagnosis: A new era for veterinary medicine

**Meet K Pandya, Suresh V Mavadiya, Arshi A Vagh, Avinash K Bilwal
and Shruti H Inamdar**

DOI: <https://www.doi.org/10.22271/veterinary.2026.v11.i4Sb.3185>

Abstract

Artificial Intelligence (AI) is emerging as a transformative tool in veterinary medicine and livestock management. This review highlights its role in disease diagnosis, precision farming, and clinical decision support. AI, through subsets such as machine learning, deep learning, and natural language processing, enables rapid data processing, pattern recognition, and real-time monitoring of animal health. Applications include diagnostic algorithms for hypoadrenocorticism, deep learning models to differentiate canine brain tumors, mastitis prediction in dairy cattle, ultrasonography-based productivity analysis, and recurrent neural networks for early prediction of chronic kidney disease in cats. Diagnostic tools such as electronic noses, VETSCAN IMAGYST, Signal RAY, and Signal SMILE further demonstrate AI's potential in routine practice. The study emphasizes both the merits of AI efficiency, automation, precision, cost-effectiveness and its limitations, including data variability, lack of interpretability, privacy concerns & high costs. Overall, AI is not a replacement for clinicians but a supportive technology that enhances decision-making, diagnosis, and treatment. Future integration with IoT, robotics, and blockchain promises to advance sustainable animal health, welfare, and productivity.

Keywords: Artificial intelligence, veterinary diagnostics, predictive analysis, digital health technologies

1. Introduction

The Artificial intelligence (AI) is a branch of computer science in which computer systems are designed to perform tasks that mimic human intelligence. AI is reshaping day-to-day life and has numerous emerging medical applications poised to profoundly reshape the practice of veterinary medicine. Artificial intelligence is now widely accepted as a transformative technology (poole *et al.*, 1998) [18]. AI mimics human cognitive functions such as learning, reasoning, and problem-solving. It enhances scientific and engineering workflows by simulating and augmenting human intelligence. Through experience-based learning and adaptation, AI enables machines to make human-like decisions (Muthukrishnan *et al.*, 2020) [13].

AI encompasses a diverse range of methodologies, such as computer vision, natural language processing, and machine learning, each offering unique capabilities for pattern recognition, prediction, and large-scale data analysis (Olawade *et al.*, 2023) [17]. The ability of AI to process vast amounts of data swiftly and efficiently makes it invaluable for identifying patterns and reducing subjectivity, which can significantly improve project outcomes (Curti *et al.*, 2023) [7]. AI involves simulating human problem-solving, logic, and behaviour. Its use in clinical practice and animal disease diagnosis is rapidly advancing alongside precision medicine, genomics, and teleconsultation. Current applications including cardiology, neurology, oncology, and diagnostic imaging, showing great promise for future animal healthcare. Modern AI originated in the 1950s when Alan Turing proposed the Turing Test to evaluate machine intelligence. The formal field of AI research was established in 1956, with John McCarthy coining the term "Artificial Intelligence" (McCarthy, 2007) [12]. The proper utilization and careful curation of data will be crucially dependent on veterinarians. The knowledge of veterinarians will be essential to ensuring the quality of data and, ultimately,

AI that meets the demands of the field (Appleby *et al.*, 2022) [2]. The veterinary field is experiencing a profound shift through the adoption of digital technologies. These innovations are streamlining practice efficiency, strengthening teamwork among veterinary professionals, and ultimately advancing animal health outcomes. From telemedicine to artificial intelligence (AI), digital tools are redefining the way veterinary care is provided. Reflecting this evolution, the 2025 World Veterinary Day theme - “Animal Health Takes a Team” emphasizes the critical importance of collaboration in contemporary veterinary practice (Ilavarasan *et al.*, 2025) [20].

2. Hierarchy & subsets of AI

2.1 Information representation, Planning and NLP

Encompasses key areas such as information representation and reasoning (structuring knowledge for problem-solving), planning & automated scheduling (optimizing complex tasks through intelligent agents), and natural language processing (NLP) (enabling computers to understand and extract

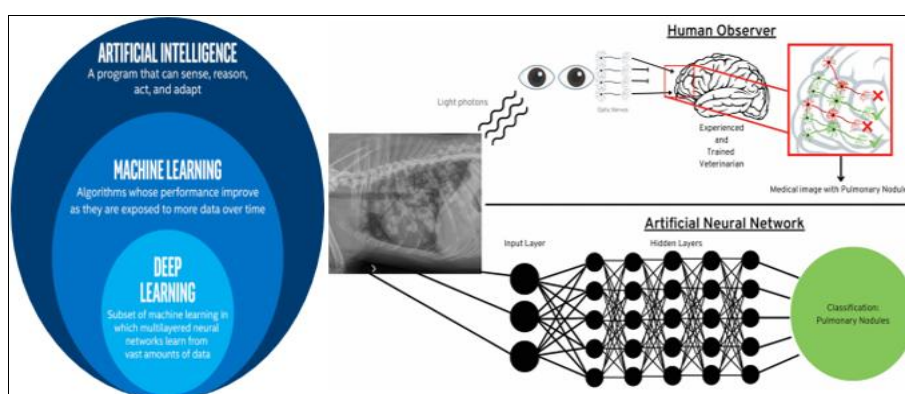
meaning from human language) (Nadkarni *et al.*, 2011) [14].

2.2 Machine learning (ML)

Process of utilizing mathematical models of data to make computer learn without direct instruction given and algorithms to identify patterns in data, enabling predictions and decisions without explicit instructions. With more data and experience, its accuracy improves, though human expertise is needed to design effective data representations. ML algorithms are applied in speech recognition, computer vision, email filtering, and medical fields where conventional algorithms are inadequate. (El-Naqa *et al.*, 2015) [8].

2.3 Deep learning (DL)

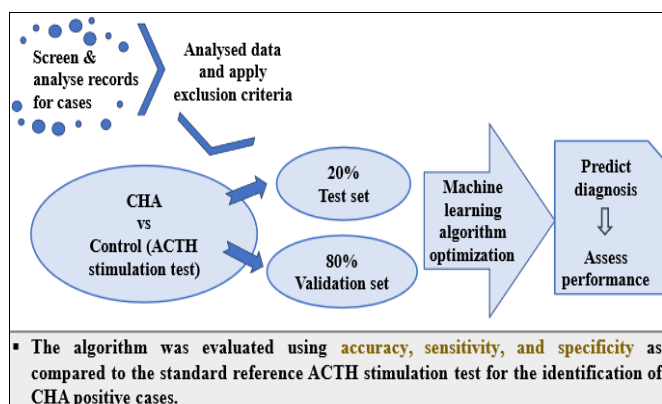
DL is composed of multiple layers of Convolutional Neural Network (CNN), uses raw data as input, and improves the representations of data for extract features automatically and pattern recognition (Bordes *et al.*, 2012) [5], (Appleby *et al.*, 2022) [2].



3. Application of artificial intelligence in animal disease diagnosis

3.1 Machine learning algorithm as a diagnostic tool for hypoadrenocorticism in dogs (Reagan *et al.*, 2020) [19]

Canine hypoadrenocorticism (Addison's disease) results from adrenal cortex destruction or cortical atrophy, causing glucocorticoid $\pm$ mineralocorticoid deficiency. It is marked by electrolyte imbalance (hyponatremia, hyperkalemia), metabolic changes (azotemia, hypoglycemia, hypocholesterolemia), and hematologic findings (lymphopenia, eosinophilia).



The machine learning classification scheme used here was based on adaptive boosting with decision trees as the weak learners using the AdaBoost algorithm (Supervised machine learning algorithm). Training set and test set were classified by the algorithm, a sensitivity of 99.5% (95%CI, 97.1%–99.9%), specificity of 99.4% (95%CI, 98.6%–99.8%) at the

optimal cut point and AUC of 0.999 (95%CI, 0.998–1) were achieved.

3.2 Methodological approach for deep learning to distinguish between meningiomas and gliomas on canine MR-images (Banzato *et al.*, 2018) [4]

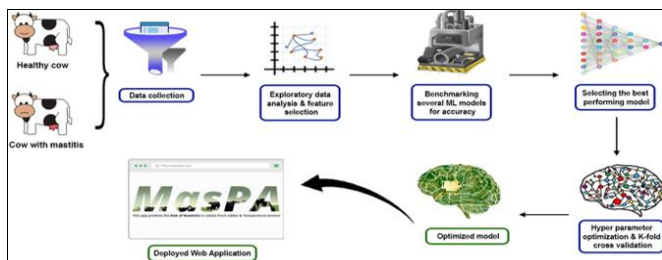
Meningiomas are the most common primary brain tumour in dogs. This study aims to assess the accuracy of a deep CNN (GoogleNet) in distinguishing meningiomas from gliomas using MRI images. Texture analysis enhances diagnostic imaging by quantifying pixel intensity patterns. Larger histologically confirmed datasets are needed to refine predictive models and develop accurate diagnostic software for canine meningiomas.

	Predicted Meningioma	Predicted Glioma
1.	n = 37	n = 1
2.	n = 0	n = 29

3.3 Meta-analysis of cow-basis prevalence of subclinical mastitis in dairy cow (Bangar *et al.*, 2015) [3]

Milk samples of cows were analyzed using eight variables (Volume, Fat, Protein, Lactose, EC, Milking Time, Peak Flow, and SCC). The dataset was imported into RapidMiner MasPA software with SCC as the output variable and other variables as inputs. Decision tree models were applied to classify SCC values based on these input features. Lactose emerged as the key feature in determining mastitis patterns. Random Forest models further revealed that cows with low lactose levels (≤ 4.5 g/L) and low milk volume (≤ 21.7 L) consistently (100%) had mastitis. MasPA is an application that predicts the risk of mastitis in cattle using odour and

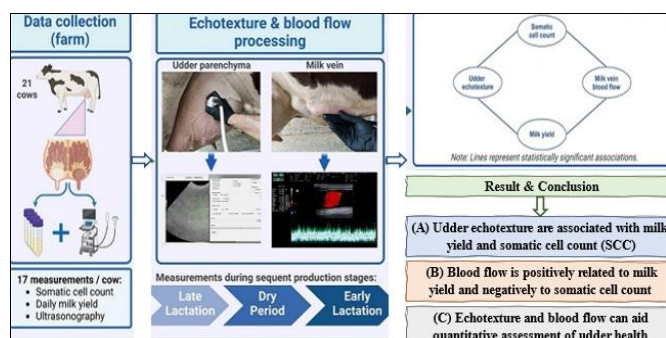
temperature sensor data analyzed through a Random Forest algorithm. It achieved 98.1% accuracy, with 99.4% sensitivity and 98.8% specificity.



3.4 Use of Ultrasonography (Data of 3072 B-Mode sonogram) to predict productive stage of dairy cow

Ultrasonography is a practical tool for evaluating mammary parenchyma and blood flow. This study examined the relationship between udder echotexture, milk vein blood flow volume (BF Vol), somatic cell count (SCC), and daily milk yield (DMY) from late lactation through the dry period to early lactation. Echotexture analysis of B-mode sonograms was used to assess mammary tissue structure. A portable ultrasound scanner (My Lab™ One VET, Esaote, Italy) with a multi-frequency linear transducer (2.5–10 MHz) was used; scans were performed at 10 MHz, 4–6 cm depth, 58% gain, and neutral time-gain compensation.

In cows, milk vein diameter ($D1 \approx 0.53\text{--}0.56\text{ cm}$; $D2 \approx 2.31\text{--}2.39\text{ cm}$) & vein area ($\approx 5.6\text{--}5.9\text{ cm}^2$) remained similar across late lactation, dry period, and early lactation ($p > 0.05$). Blood flow volume, however, was lowest in the dry period (2.7 L/min) compared to late lactation (5.3 L/min) & highest in early lactation (7.2 L/min) ($p < 0.01$). Similarly, mean velocity (TAMV) was reduced in the dry period (8.2 cm/s), peaked in early lactation (20.6 cm/s) ($p < 0.01$) (Themistokleous *et al.*, 2023) [21].



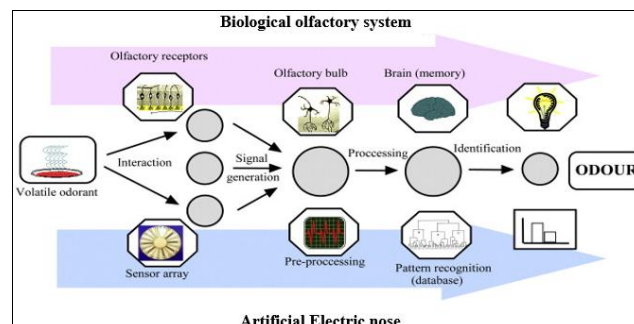
3.5 Predicting early risk of chronic kidney disease (CKD) in cats by using routine clinical laboratory tests and machine learning with Renaltech™ Tool (Bradley *et al.*, 2019) [6]

Renaltech™ tool was developed which helps in predicting CKD in cats. The algorithm helps vets to determine whether the cats will develop CKD in the next two years or not, with an accuracy level of 95 percent, the final model was a recurrent neural network (RNN) built using four features: creatinine, blood urea nitrogen, urine specific gravity, and age. At the point of CKD diagnosis, the model achieved a sensitivity of 90.7% and a specificity of 98.9%. However, sensitivity declined as the prediction window increased dropping to 63.0% one year before diagnosis and 44.2% two years before diagnosis—while specificity consistently remained around 99%.

4. Applied diagnostic instrumentation of ai for animal disease diagnosis

4.1 Gas Sensor Array / Electronic Nose (Haselzadeh *et al.*, 2021) [10]

An electronic nose (E-nose) with gas sensor arrays, mimicking the human olfactory system, was developed to predict and detect dairy cattle diseases (DCDs). The device analyzes odour samples, and with AI algorithms based on machine learning (ML) and deep learning (DL), enables rapid, cost-effective disease detection and diagnosis.



4.2 Vetscan Imagyst

The VETSCAN IMAGYST system, developed by Zoetis, point-of-care diagnostic tool that simplifies fecal examinations and reduces examiner bias. This study evaluated its performance in detecting feline parasites (*Ancylostoma*, *Toxocara cati*) & protozoa (*Isospora*, *Giardia*), and compared its centrifugal flotation method with reference methods. Combining AI with imaging technology, this system supports rapid, accurate diagnostics in parasite detection, cytology, haematology, and telemedicine integration (Nagamori *et al.*, 2021) [15].

4.3 Signal Ray and Signal Smile

Signal RAY uses patented AI and deep learning technology to analyze companion animal radiographs. It provides real-time assessment for conditions such as thoracic masses.

The system delivers reliable, proven diagnostic results for veterinarians. Signal SMILE leverages veterinary AI and machine learning to evaluate companion animal dental radiographs. It performs real-time detection of abnormalities such as furcation bone loss. The system supports veterinarians by enhancing accuracy and efficiency in diagnosis.

5. Merits and Limitations of AI

Artificial Intelligence offers numerous merits across diverse fields. It enhances efficiency and automation by saving time and minimizing errors through task automation. In decision-making, AI processes large datasets, identifies patterns, and provides valuable insights for better outcomes. Within healthcare and diagnostics, it enables early disease detection, predictive analytics, personalized treatment plans, faster imaging, and efficient data management. Additionally, AI contributes to customer service, research, and welfare by powering chatbots, telemedicine, genetic studies, selective breeding, cost reduction, non-invasive monitoring, and improving overall animal and human well-being.

Artificial Intelligence in veterinary medicine faces challenges such as limited datasets, species variability, and poor generalization. Black-box models lack interpretability, raising risks of misdiagnosis, while real-time use may falter with incomplete data. High costs, privacy concerns, and the

absence of standardized validation frameworks further restrict its widespread adoption, highlighting the need for expert oversight and ethical safeguards (Esteve *et al.*, 2019) ^[9].

6. Conclusion

Recent advances and applications of Artificial Intelligence (AI) in the veterinary field present both challenges and opportunities for the veterinary community to understand, interpret, and adopt this rapidly evolving technology. Rather than replacing clinicians, AI supports them by providing updated knowledge, aiding decision-making, and improving efficiency. It promises faster, more accurate diagnosis and treatment, enhancing overall animal care (Okeibunor *et al.*, 2023) ^[16]. Effective AI integration in veterinary practice requires collaboration, ethical standards, regulation, and training. With continued research and development, AI can improve diagnostics, therapies, and decision support, especially in underserved areas, ultimately enhancing animal health, welfare, and productivity (Hassanein *et al.*, 2025) ^[11].

7. Future trends and potential impact of AI

AI is becoming vital in animal healthcare, with applications in disease diagnosis, genetic screening, telemedicine, and real-time outbreak monitoring. Integration with IoT, robotics, and blockchain further enhances productivity, prevention, and animal welfare (Aijaz *et al.*, 2025) ^[1].

Conflict of Interest

Not available

Financial Support

Not available

References

- Aijaz N, He L, Raza T, Yaqub M, Iqbal R, Pathan MS. Artificial intelligence in agriculture: Advancing crop productivity and sustainability. *Journal of Agriculture and Food Research*. 2025;20:101762.
- Appleby RB, Basran PS. Artificial intelligence in veterinary medicine. *Journal of American Veterinary Medical Association*. 2022;260(8):819-824.
- Bangar YC, Singh B, Dohare AK, Verma MR. A systematic review and meta-analysis of prevalence of subclinical mastitis in dairy cows in India. *Tropical Animal Health and Production*. 2015;47(2):291-297.
- Banzato T, Bernardini M, Cherubini GB, Zotti A. A methodological approach for deep learning to distinguish between meningiomas and gliomas on canine MR-images. *BMC Veterinary Research*. 2018;14:317.
- Bordes A, Glorot X, Weston J, Bengio Y. Joint learning of words and meaning representations for open-text semantic parsing. In: *International Conference on Artificial Intelligence and Statistics*; 2012. p. 127-135.
- Bradley R, Tagkopoulos I, Kim M, Kokkinos Y, Panagiotakos T, Kennedy J, *et al.* Predicting early risk of chronic kidney disease in cats using routine clinical laboratory tests and machine learning. *Journal of Veterinary Internal Medicine*. 2019;33(6):2644-2656.
- Curti PF, Selli A, Pinto DL, Merlos-Ruiz A, Balieiro JCC, Ventura RV. Applications of livestock monitoring devices and machine learning algorithms in animal production and reproduction: An overview. *Animal Reproduction*. 2023;20(2):e20230077.
- El Naqa I, Murphy MJ. What is machine learning. In: El Naqa I, Li R, Murphy M, editors. *Machine learning in radiation oncology*. Springer; 2015. p. 3-11.
- Esteve A, Robicquet A, Ramsundar B, Kuleshov V, DePristo M, Chou K, *et al.* A guide to deep learning in healthcare. *Nature Medicine*. 2019;25(1):24-29.
- Haselzadeh F. E-noses equipped with artificial intelligence technology for diagnosis of dairy cattle disease in veterinary. 2021.
- Hassanein S, Arab RAE, Abdrbo A, Abu-Mahfouz MS, Gaballah MKF, Seweid MM, *et al.* Artificial intelligence in nursing: An integrative review of clinical and operational impacts. *Artificial Intelligence in Nursing*. 2025;7:1552372.
- McCarthy J. From here to human-level AI. *Artificial Intelligence*. 2007;171(18):1174-1182.
- Muthukrishnan N, Maleki F, Ovens K, Reinhold C, Forghani B, Forghani R. Brief history of artificial intelligence. *Neuroimaging Clinics of North America*. 2020;30(4):393-399.
- Nadkarni PM, Ohno-Machado L, Chapman WW. Natural language processing: An introduction. *Journal of the American Medical Informatics Association*. 2011;18(5):544-551.
- Nagamori Y, Sedlak RH, DeRosa A, Pullins A, Cree T, Loenser M, *et al.* Further evaluation and validation of the VETSCAN IMAGYST: In-clinic feline and canine fecal parasite detection system integrated with a deep learning algorithm. *Parasites and Vectors*. 2021;14(1):89.
- Okeibunor JC, Jaka A, Iwu-Jaja CJ, Idemili-Aronu N, Ba H, Zantsi ZP, *et al.* The use of artificial intelligence for delivery of essential health services across WHO regions: A scoping review. *Frontiers in Public Health*. 2023;11:1102185.
- Olawade DB, Wada OJ, David-Olawade AC, Kunonga E, Abaire O, Ling J. Using artificial intelligence to improve public health: A narrative review. *Frontiers in Public Health*. 2023;11:1196397.
- Poole DI, Goebel RG, Mackworth AK. *Computational intelligence*. Vol. 1. Oxford: Oxford University Press; 1998.
- Reagan KL, Reagan BA, Gilor C. Machine learning algorithm as a diagnostic tool for hypoadrenocorticism in dogs. *Domestic Animal Endocrinology*. 2020;72:106396.
- Ilavarasan N, Meena M, Madabhavi P, Mishra A, Sharma M, Singh TU. Digital tools in collaborative animal healthcare: A new era for veterinary teams. *Vet Farm Frontier*. 2025;2(4):81-83.
- Themistokleous KS, Papadopoulos I, Panousis N, Zdragas A, Arsenos G, Kiossis E. Udder ultrasonography of dairy cows: Investigating the relationship between echotexture, blood flow, somatic cell count and milk yield during dry period and lactation. *Animals*. 2023;13(11):1779.

How to Cite This Article

Pandya MK, Mavadiya SV, Vagh AA, Bilwal AK, Inamdar SH. Application of artificial intelligence in animal disease diagnosis: A new era for veterinary medicine. *International Journal of Veterinary Sciences and Animal Husbandry*. 2026;SP-11(4):80-83.

Creative Commons (CC) License

This is an open-access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.