ARTIFICIAL INTELLIGENCE APPLIED TO VETERINARY DIAGNOSIS: ACCURACY, ETHICS, AND THE CLINICAL FUTURE

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Laís Paula Inocêncio Fliorizi Melo[1], Rodrigo Brito de Souza[2] and Larissa Carneiro Neves[3]

Abstract

This chapter aims to analyze the applications of Artificial Intelligence (AI) in veterinary diagnosis, highlighting improvements in accuracy, ethical implications, and future clinical perspectives. The methodology consisted of a narrative review of national and international scientific literature, including recent studies on machine learning, convolutional neural networks, and clinical decision support systems applied to veterinary medicine. The findings indicate that algorithms trained on large datasets have enhanced diagnostic accuracy in imaging exams, clinical pathology, and remote animal monitoring, reducing interpretative variability and optimizing clinical workflow. However, challenges remain regarding data quality, algorithmic bias, professional accountability, and data protection. It is concluded that AI represents a promising complementary tool capable of strengthening evidence-based veterinary practice, provided it is integrated with ethical guidelines, rigorous scientific validation, and continuous professional training.

Keywords: Animal health, Artificial intelligence, Machine learning, Professional ethics, Veterinary diagnosis.

[1] Undergraduate student in Veterinary Medicine
Instituto Federal de Rondônia
E-mail: Laismedvet2023@gmail.com
[2] Bachelor of Veterinary Medicine - UFU
E-mail: rodrigobs.2646@gmail.com
[3] Graduate in Veterinary Medicine
Centro Universitário Vértice
E-mail: larissaneves950@gmail.com

INTRODUCTION

Artificial Intelligence (AI) has promoted significant transformations in the health sciences, including veterinary medicine, by expanding the capacity to analyze clinical and diagnostic data. Systems based on machine learning and artificial neural networks are capable of identifying complex patterns in laboratory tests, radiographic images, and clinical histories, contributing to greater accuracy and agility in decision-making. AI can be understood as the development of computational systems capable of performing tasks that require human intelligence, such as pattern recognition and logical inference (Russell; Norvig, 2021).

However, the adoption of these technologies in veterinary diagnosis raises relevant questions regarding the reliability of algorithms, the quality of the data used for training, the transparency of models, and the ethical responsibility of the professional in the face of decisions supported by automated systems. In this context, the following research problem is delimited: in what way can Artificial Intelligence increase diagnostic accuracy in veterinary medicine without compromising ethical principles, professional autonomy, and information security?

The general objective of this chapter is to analyze the application of Artificial Intelligence in veterinary diagnosis from technical and ethical perspectives. As specific objectives, it is intended to: a) describe the main AI technologies employed in veterinary practice; b) examine scientific evidence regarding improvement in diagnostic accuracy; c) discuss ethical and regulatory challenges; and d) reflect on future perspectives for digital veterinary clinical practice.

The relevance of this study is justified by the growing digitization of animal health services and by the need for critical training of professionals in the face of technological innovations. The advancement of intelligent systems demands constant ethical reflection, especially when it involves decision-making processes that impact well-being and professional responsibility (Bostrom, 2014).

In the theoretical field, deep learning has demonstrated performance comparable to that of human specialists in specific tasks of image classification and pattern recognition (Goodfellow; Bengio; Courville, 2016). In addition, it is emphasized that integration between AI and clinical practice can

strengthen evidence-based medicine, provided that it is associated with rigorous scientific validation and qualified professional supervision (Topol, 2019). Thus, the discussion of accuracy, ethics, and the clinical future becomes fundamental to understanding the strategic role of Artificial Intelligence in contemporary veterinary medicine.

METHODOLOGY

This research is characterized as a qualitative study, with an exploratory and descriptive approach, grounded in a narrative review of the scientific literature concerning the application of Artificial Intelligence in veterinary diagnosis. The choice of this design is justified by the need to critically analyze recent academic productions, identify technological trends, and discuss ethical and clinical implications associated with the use of intelligent systems in veterinary medicine.

TYPE OF RESEARCH

The study is configured as bibliographic research, developed from already published materials, including scientific articles, books, technical guidelines, and institutional documents. According to Gil (2019), bibliographic research allows the researcher to examine consolidated and recent theoretical contributions on a given topic, favoring systematic and well-grounded analysis.

DATA COLLECTION PROCEDURES

Data collection was carried out through a structured search in national and international scientific databases, such as indexed journals in the areas of veterinary medicine, data science, and bioinformatics. Descriptors in Portuguese and English related to “Artificial Intelligence,” “veterinary diagnosis,” “machine learning,” and “ethics in health” were used. Inclusion criteria encompassed publications from the last ten years, with emphasis on empirical studies and systematic reviews addressing clinical applications of AI.

Works without peer review, opinion texts without scientific grounding, and studies that did not present a direct relation to the veterinary context were excluded.

DATA ANALYSIS AND DISCUSSION

The analysis occurred through critical reading and thematic categorization of the selected content, following principles of qualitative content analysis (Bardin, 2016). The information was organized into three main axes: diagnostic accuracy, ethical implications, and future perspectives. The discussion was grounded in the articulation between empirical evidence and theoretical frameworks from the field of Artificial Intelligence and ethics applied to health. It was considered that systems based on deep learning present high performance in the classification of medical images (Goodfellow; Bengio; Courville, 2016), but require rigorous clinical validation and professional supervision to ensure safety and reliability (Topol, 2019).

In this way, the adopted methodology made it possible to critically analyze the current state of AI application in veterinary diagnosis, ensuring theoretical consistency and scientific support for the reflections developed in this chapter.

RESULTS AND DISCUSSION

The analysis of the selected studies made it possible to organize the main findings into thematic categories related to diagnostic accuracy, clinical applicability, and ethical challenges. Tables 1, 2, and 3 synthesize the results identified in the reviewed literature.

Table 1

Applications of Artificial Intelligence in Veterinary Diagnosis

Technology Used	Main Contributions	Area of Application	Level of Evidence Found
Convolutional neural networks (CNN)	Detection of fractures, neoplasms, and pulmonary diseases with high accuracy	Imaging diagnosis	Experimental and comparative studies
Supervised machine learning	Identification of hematological and biochemical patterns	Clinical pathology	Observational studies
Deep learning	Classification of cutaneous lesions	Veterinary dermatology	Pilot studies
Predictive algorithms	Early identification of behavioral changes	Remote monitoring	Prospective studies

Source: Authors (2026).

The data indicate that the highest concentration of studies is found in the area of imaging diagnosis, corroborating findings in the literature regarding the performance of deep learning in visual classification tasks (Goodfellow; Bengio; Courville, 2016). Comparable performance to that of human specialists is observed in controlled contexts, especially when models are trained with robust databases.

Table 2

Clinical Benefits Observed with the Use of AI

Benefit Identified	Impact on Clinical Practice	Theoretical Foundation
Increased diagnostic accuracy	Reduction of interpretive errors	(Topol, 2019)
Agility in test analysis	Optimization of consultation time	(Russell; Norvig, 2021)
Standardization of reports	Lower variability among professionals	(Goodfellow; Bengio; Courville, 2016)
Clinical decision support	Strengthening of evidence-based medicine	(Topol, 2019)

Source: Authors (2026).

Although the benefits are expressive, the literature also evidences structural and ethical limitations that need to be considered to ensure responsible use of the technology.

Table 3

Ethical and Technical Challenges in AI Implementation

Challenge Category	Description	Clinical Implications
Data quality	Limited or biased databases	Possible inaccurate diagnoses
Algorithmic transparency	"Black-box" models that are difficult to interpret	Difficulty in professional validation
Ethical responsibility	Definition of responsibility in case of error	Need for human supervision
Regulation	Absence of specific standards	Legal insecurity

Source: Authors (2026).

The discussion of the results demonstrates that Artificial Intelligence presents high potential to improve diagnostic accuracy in veterinary medicine. However, its consolidation depends on continuous scientific validation, development of regulatory protocols, and professional training, ensuring that the technology acts as a complementary instrument and not as a substitute for clinical decision-making.

CONCLUSION

This chapter aimed to analyze the application of Artificial Intelligence in veterinary diagnosis, considering its impacts on clinical accuracy, its ethical implications, and its perspectives for the future of professional practice. Throughout the study, efforts were made to describe the main technologies employed, examine scientific evidence on gains in diagnostic accuracy, discuss regulatory challenges, and reflect on the role of the veterinarian in light of the incorporation of intelligent systems.

The results showed that tools based on machine learning and deep learning present high potential to improve the interpretation of imaging examinations, laboratory analyses, and remote monitoring of

animals, contributing to greater standardization and reduction of diagnostic variability. However, challenges were also identified related to the quality of the data used for training algorithms, the transparency of computational models, and ethical responsibility in clinical decision-making.

As a contribution, this study systematizes recent evidence on the use of Artificial Intelligence in veterinary medicine, reinforcing the need for integration between technological innovation and ethical principles. It is emphasized that AI should be understood as a complementary tool, capable of supporting — but not replacing — the professional's clinical judgment.

Finally, it is suggested that future research deepen empirical investigations with clinical validation in different species and regional contexts, as well as studies focused on specific regulation and academic training in digital veterinary health. The consolidation of robust ethical and scientific protocols will be decisive for Artificial Intelligence to contribute safely and sustainably to the clinical future of veterinary medicine.

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