



Analysis of Anthropogenization and Transformation of the Human-Animal Bond in Ecuador

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ABSTRACT

The human-animal bond is currently experiencing a profound paradigm shift globally. The present study addresses the growing transformation of human-animal relationships in contemporary societies. The current study aimed to offer a critical narrative review of the anthropogenization of companion animals in Ecuador, understood as the process through which dogs, cats, and other domestic species acquire social, normative, and moral meanings that transform interspecies coexistence. Based on an interdisciplinary review of academic databases, regulatory documents, and institutional reports, the study integrates evidence from cognitive ethology, human-animal psychology, law, and urban sociology. Three central axes are analyzed. The first axis examined the impact of language, particularly ownership versus guardianship, on care practices. The second axis explores the tension between scientific evidence on animal agency and current regulations. The third axis evaluates the implications of anthropogenization for animal-welfare governance in diverse territorial contexts. The analysis identified contradictions between the biocentric constitutional framework and secondary legislation that retains possessive registers. The findings also revealed the simultaneous emergence of pathological anthropomorphization and positive anthropogenization processes. In addition, significant empirical gaps were identified for the design of coherent public policies. The study proposes an interdisciplinary research agenda and presents recommendations aimed at aligning terminology, education, and governance, with emphasis on territorial strategies and participatory approaches. Overall, the manuscript provides a conceptual framework to guide applied studies and regulatory reforms in countries characterized by sociocultural heterogeneity, such as Ecuador.

Keywords: Animal ethic, Animal right, Animal abuse, Anthropogenization, Education, Guardianship

INTRODUCTION

The relationship between humans and companion animals is undergoing a profound transformation in the 21st century, altering how societies conceive of this interspecies bond as a social, emotional, and moral relationship that cannot be reduced to traditional categories of ownership or utility (Jardat and Lansade, 2021). In high-income countries, advances in disciplines such as cognitive ethology, affective neuroscience, comparative psychology, and human-animal studies have demonstrated that species such as dogs and cats possess complex socio-emotional skills, agency, communicative competencies, and relational structures that challenge traditional conceptual frameworks based on instrumentalization or ownership (Ellis et al., 2024). The growing body of scientific knowledge has fueled international debates on the moral and legal status of companion animals, opening the door to new ways of understanding coexistence, human co-responsibility, and the role of animals as subjects with their own affective and cognitive experiences (Leconstant and Spitz, 2022). A theoretical and political reconfiguration of the human-animal relationship beyond classical anthropocentrism, prompting a critical reassessment of categories such as welfare, guardianship, agency, and animal dignity (Michel, 2023).

In parallel, multilateral organizations, professional associations, and local governments have attempted to adapt regulatory frameworks to emerging social and ethical sensitivities (Browning and Veit, 2022). Several European and North American cities have incorporated responsible pet ownership approaches, limited practices considered harmful, reproductive regulations, and evidence-based welfare policies (Contalbrigo et al., 2024). In addition, proposals have emerged to replace terms such as “owner” or “proprietor” with categories including “guardian” or “caretaker”, arguing that language shapes moral perceptions and care practices (De Castro et al., 2026). However, despite these efforts, recent literature agrees that regulatory advances have not resolved the structural tensions between patrimonial legal frameworks and contemporary sensibilities that recognize animal agency and subjectivity (Gutmann, 2024). International evidence has consistently demonstrated a mismatch between regulatory frameworks and their effective implementation, between public narratives and observed realities, and between societal expectations and the institutional capacity required to ensure comprehensive animal welfare (Villafañe-Ferrer et al., 2020).

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In Latin America, such tensions take on distinctive characteristics due to the coexistence of traditional perspectives with emerging animal rights movements, rapid urbanization, socioeconomic inequalities, and fragmented institutional systems (Yerbury and Lukey, 2021). Although several countries in Latin America have incorporated legal recognition of animals as sentient beings and updated animal protection laws, implementation remains uneven across jurisdictions, with documented deficiencies in enforcement mechanisms, limited availability of empirical data to support decision-making, insufficient institutional capacity to manage urban dog and cat populations, and the persistence of culturally rooted practices that vary significantly across territorial contexts (Zinsstag et al., 2023). Thus, the human-animal relationship in the region is characterized by profound heterogeneity, where forms of care, the meanings attributed to animals, and the state's capacity to regulate their welfare vary significantly between urban, peri-urban, and rural areas (Mota-Rojas et al., 2023).

Ecuador represents a relevant case for examining regulatory and socio-cultural tensions in the human-animal relationship. Although the country was a pioneer in recognizing nature as a subject of rights in its 2008 constitution, this biocentric framework has not been consistently translated into the domestic and urban sphere (Garate Amoroso et al., 2024). Most regulations concerning companion animals remain framed within civil-law categories of property, ownership, and control, which contrast with emerging social expectations that regard animals as affectionate members of the household (Gutmann, 2024). The coexistence of a progressive discourse on the rights of nature with a traditional treatment of domestic animals reveals a conceptual dissonance that hinders the development of coherent policies (Hiby et al., 2023). Even though several municipalities have developed ordinances to regulate coexistence, promote sterilization, and penalize mistreatment, these efforts have failed to articulate a comprehensive vision or resolve structural problems such as urban population management, the lack of inter-institutional coordination, or the absence of national animal welfare indicators (Gallo et al., 2022).

Legal and administrative language constitutes one of the domains where such dissonance becomes particularly evident. The persistence of terms such as “owner,” “holder,” or “proprietor” reflects cognitive frameworks rooted in a patrimonial conception of the human-animal bond (Helms and Bain, 2009). Although in other countries the discussion about adopting the terms “guardian” or “owner” has gained relevance, in Ecuador this debate has not yet translated into public policies or substantive regulatory reforms (Lapo-Bonilla et al., 2025). The persistence of outdated legal and conceptual frameworks limits the possibility of promoting profound cultural change and hinders the incorporation of contemporary scientific perspectives on animal agency, sentience, and subjectivity (Dawson et al., 2021). In addition, there is a lack of empirical studies that assess how terminology influences the perception of responsibilities, daily behavior, or decisions that affect the animal's well-being (Orr et al., 2023).

Understanding these challenges requires analyzing the phenomenon of anthropogenization not as a simple affective humanization, but as a multidimensional process through which companion animals acquire emotional, symbolic, cognitive, and normative meanings within the social structure (Ellis et al., 2024). Anthropogenization implies a reconfiguration of the human-animal bond that transforms animals into active participants in family, urban, and community life (Göttert and Perry, 2023). In Ecuador, this process manifests unevenly, with intense attachment practices coexisting in urban areas alongside utilitarian or functional relationships in other contexts, creating a heterogeneous landscape that has not yet been studied comprehensively (Benalcázar Jarrín et al., 2025).

Despite growing public attention to companion animals, Ecuadorian literature remains fragmented, as studies on citizen perceptions, evaluations of local ordinances, ethical reflections, and legal debates often develop along parallel paths without a unified conceptual framework to understand their interrelationships. This lack of integration makes it difficult to identify patterns, contradictions, omissions, and opportunities for more coherent animal welfare governance (Stucki, 2023). Therefore, the present study aimed to conduct an interdisciplinary critical narrative review to develop a conceptual framework for understanding the anthropogenization of companion animals and its sociocultural and normative implications in Ecuador.

MATERIALS AND METHODS

Sources and search strategy

The online search was conducted between October 2023 and November 2025 in Scopus, Web of Science, SciELO (Scientific Electronic Library Online), and Google Scholar, complemented with Ecuadorian institutional repositories, normative and legal documents, including the [Constitution of the Republic of Ecuador \(2008\)](#), the [Organic Law of Animal Welfare \(2022\)](#), municipal ordinances from different cities, and official reports such as those issued by the Council for the Protection of Rights of the Metropolitan District of Quito. Searches were conducted in English and Spanish using keyword combinations related to anthropogenization, anthropomorphization, possessive language, animal guardianship, urban animal welfare, and governance. Boolean operators (AND, OR) were used to structure queries

across titles, abstracts, and keywords. A representative search string used in Scopus and Web of Science was as follows ("companion animal" OR "pet" OR "dog" OR "cat") AND ("guardian" OR "owner" OR "proprietor" OR "holder") AND (terminolog OR language OR discourse) AND ("animal welfare" OR governance) AND (Ecuador OR "Latin America").

Inclusion criteria

To build a coherent interdisciplinary corpus, source selection included theoretical and empirical peer-reviewed articles addressing the conceptual, ethical, legal, and social dimensions of the human-animal relationship. The review also incorporated conceptual monographs, institutional reports, comparative legal analyses, and relevant Ecuadorian normative documents such as laws and municipal ordinances essential for understanding local governance and institutional practices.

Exclusion criteria

To maintain conceptual focus and methodological rigor, the review excluded medical and veterinary studies that did not explicitly address animal welfare, sentience, or the human-animal relationship. Studies focusing exclusively on commercial livestock production were also omitted to prioritize companion animals in urban contexts. Finally, documents lacking verifiable access or sufficient methodological transparency were excluded to ensure reliability.

Analytical procedure

Adapted from established methodological frameworks for thematic synthesis, the analytical procedure was structured into sequential stages starting with corpus mapping to identify and classify sources by thematic focus and discipline. The process was followed by thematic coding, which systematically organized the literature into key conceptual axes, including language and terminology, cognitive and ethological evidence, normativity and legal frameworks, territorial practices, and anthropogenization processes (Braun and Clarke, 2006). The resulting analytical structure, summarizing how these dimensions interact to shape human-animal relationships and animal welfare, is presented in Table 1. The third stage comprised interpretive integration, aimed at establishing analytical dialogues between international evidence and Ecuadorian documents. This phase emphasized the examination of similarities, divergences, and epistemological gaps, allowing for a contextualized understanding of how global debates are translated and adapted within the national framework. Finally, the fourth stage involved critical synthesis, through which a coherent narrative was constructed to conceptualize anthropogenization as a multidimensional and relational phenomenon. This synthesis highlights the interplay between cultural, legal, and affective dimensions, providing a comprehensive perspective on the transformation of the human–animal relationship.

Table 1. Key analytical axes, conceptual variables, and their implications in animal welfare

Analytical axis	Description	Key variables	Implications for animal welfare
Language and terminology	Examines the use of terms such as “owner” versus “guardian” and their cognitive effects	Ownership versus guardianship, discourse framing	Influences empathy, responsibility, and care practices
Cognitive and ethological evidence	Integrates findings on animal cognition and socio-emotional capacities	Agency, sentience, and communication abilities	Challenges objectification and supports moral consideration
Normativity and legal framework	Analyzes laws, ordinances, and institutional discourse in Ecuador	Legal status, regulatory coherence	Reveals contradictions between constitutional principles and practice
Territorial practices	Evaluates differences across urban, peri-urban, and rural contexts	Socioeconomic factors, cultural practices	Explains variability in welfare outcomes
Anthropogenization	Process of assigning social and moral meaning to animals	Emotional integration, social roles	Can improve welfare if aligned with biology
Anthropomorphization	Attribution of human traits to animals	Projection, emotional substitution	May be positive or pathological depending on context

FROM POSSESSIVE OWNERSHIP TO RELATIONAL GUARDIANSHIP

The use of the term "owner" to refer to those responsible for companion animals reflects a significant conceptual lag relative to contemporary developments in animal law and cognitive ethology (Sinclair et al., 2022). Although the category of animals as property originates from the 19th-century Spanish legal tradition, when animals were classified as movable property in pre-constitutional civil codes, the persistence of this legal classification in Ecuadorian legal and municipal discourse demonstrates the enduring legacy of an anthropocentric worldview (Garzón-Rosero and Chávez-Intriago, 2021). Legal historical studies in countries with a civil law tradition indicate that such classifications did not

emerge from ethical or bioscientific analysis, but rather from the accounting and administrative needs of agrarian and colonial societies (Hill et al., 2025). Ecuador, after the constitutional recognition of Pachamama in 2008, continues to use the same possessory registration system that was in place in 1861, which constitutes a normative inconsistency that international literature identifies as a "structural dissonance" (Chugá-Elizalde et al., 2024).

Empirical evidence demonstrates that such dissonance is not merely symbolic but performative, as language has the capacity to shape ethical attitudes (Koppel et al., 2025). Recent psycholinguistic studies indicate that the use of possessive categories when referring to sentient beings is associated with reduced empathy, increased tolerance toward harm, and the reinforcement of utilitarian cognitive frameworks (Ding and Zhang, 2023). In Ecuador, the relationship between the language used to refer to animals and empathy toward them is evident. Recent studies have shown that the use of terms that imply possession, such as "owner," can reduce empathy toward animals, while more neutral terms or those that suggest responsibility, such as "guardian," can foster more prosocial attitudes and a greater willingness to assume ethical responsibilities (Ijichi et al., 2020).

A correlation between the persistence of possessive language and adverse animal welfare outcomes is also observed at the territorial level; in the Metropolitan District of Quito, where such language remains present in community discourse and local ordinances, high rates of abandonment and mistreatment of companion animals have been recorded (Municipality of Quito, 2020). According to the final monitoring report on the implementation of public policies for the prevention of companion animal abuse, it was documented that, during the period from May 2021 to August 2022, the number of companion animals found abandoned or poisoned reached alarming figures, highlighting the need for a change in the perception and treatment of these beings (Consejo de Protección de Derechos del DMQ, 2023). This pattern coincides with international findings that identify links between linguistic objectification and animal abandonment (Fryer, 2022).

Beyond the psychological realm, animal cognitive science provides compelling evidence to question the ontological validity of the category of owner (Nematipour et al., 2022). Dogs and cats possess advanced socio-emotional skills, including recognizing human intentions, episodic memory, interpreting affective cues, and interspecies communication abilities (Pickersgill et al., 2023). Although Ecuadorian studies remain limited in methodological scope and national coverage, they corroborate previous international evidence; a literature review on animal welfare in Ecuador conducted by Villamar (2023) indicates that emotional sensitivity in mixed-breed dogs is comparable to that described in European research, highlighting the importance of considering emotional well-being in the local context. In this scenario, continuing to reproduce terms derived from the legal regime of movable property renders cognitive abilities invisible and perpetuates a classification framework incompatible with contemporary scientific evidence.

Ecuadorian jurisprudence is beginning to reflect this conceptual tension. In Ruling No. 253-20-JH, the Constitutional Court affirmed that animal welfare must be considered in the regulation of property rights, aligning itself with the Constitution's biocentric vision, which recognizes the intrinsic importance of living beings and their relationship to human and environmental well-being (Grijalva, 2025). An epistemic shift, also discussed in Anglo-Saxon literature, is reflected in the evolution of the term "owner" toward "guardian," where the figure of the guardian has been consolidated as an appropriate representative to defend the interests of animals in various jurisdictions, emphasizing responsibility and welfare rather than mere ownership (EMIRI, 2024). However, in Ecuador, this transition is still incipient, as more than 40% of the regulatory articles of the Organic Law on Animal Welfare (2022) maintain possessive language, which generates contradictions with the constitutional spirit and with the international scientific body of knowledge (Vernaza Arroyo and Cruel Preciado, 2024).

Given the persistence of possessive language in Ecuadorian regulatory frameworks, the proposed terminological alternatives, guardian and responsible keeper, are not mere semantic substitutions but rather conceptual tools with demonstrable practical implications. Comparative literature on animal welfare has shown that relational models based on guardianship lead to significant increases in caring behaviors, regulatory compliance, and adherence to health campaigns (Penaforte et al., 2024). Cities that have adopted "guardian" and "responsible ownership" models have shown increased awareness of civic responsibility toward animals (Zoanetti et al., 2024). In Ecuador, although with regional variations, progressive regulatory trends are evident, as a recent study reports that many local jurisdictions have begun adopting more inclusive terms in their ordinances since the second half of the last decade (Tănăsescu et al., 2024). These findings suggest that the transition toward more animal-centered legal terminology is occurring unevenly across the country, reflecting differences in the pace of regulatory adoption among local jurisdictions (Méndez Juez et al., 2020).

The practical effects of this terminological shift are beginning to emerge. In Latin America, numerous scientific studies have demonstrated that territorial differences in animal welfare practices and responsible pet ownership reflect structural patterns associated with educational level, degree of urbanization, and availability of cultural capital (Gallo et al., 2022). Recent studies have shown that the adoption of responsible practices (sterilization, vaccination, and registration) is significantly higher in urban areas with greater socioeconomic development and access to services, while

peri-urban and rural areas continue to experience gaps linked to education, poverty, and territorial inequality (Atero et al., 2024).

The integrated interpretation of available evidence suggests that terminology has a profound structural effect on the animal welfare ecosystem (Cornish et al., 2023). Language influences how responsibilities are distributed, how institutions design policies, and the type of affective relationship established with animals (Piermattei et al., 2024). From an ethical perspective, omitting such a shift means ignoring the growing international consensus that human–animal relationships should be based on models of shared responsibility, not rigid hierarchies of ownership (Bergmann, 2019). From a sociological perspective, maintaining the figure of the owner perpetuates colonial patterns of domination over living beings, while the transition to relational categories fosters civic practices more compatible with the Ecuadorian constitutional paradigm (Kauffman and Martin, 2018). Thus, the analysis revealed that Ecuador was at a critical juncture in which it must either deepen the conceptual coherence demanded by its Constitution by adopting language that recognizes animals as subjects of protectable interests or maintain a semantic system that reproduces legal tensions, ethical contradictions, and negative outcomes in public policy. The adoption of the concept of guardianship, or responsible guardianship, far from being a superficial gesture, constitutes a necessary strategy for achieving normative, cognitive, and cultural alignment in modernizing the country's animal welfare system.

ETHICAL, SOCIAL, AND PRACTICAL IMPLICATIONS IN ECUADOR

The ethical, social, and practical implications of replacing the term “owner” with “guardian” or “responsible caretaker” become particularly significant in the contemporary Ecuadorian context, where a biocentric constitutional framework coexists with cultural practices that reproduce historical logics of interspecies domination (Viviani, 2023). Far from being a mere linguistic flourish, recent literature argues that this terminological shift constitutes a structural variable capable of modifying moral behavior, community organization, and institutional efficiency (Henning et al., 2023). Indeed, studies in animal ethics have demonstrated that relational categories generate a greater internalization of ongoing moral obligations, given that the term “guardian” cognitively activates the notion of permanent custody and representation of the animal's interests, rather than powers of disposition and control (Kiani et al., 2022). Consistent with findings in comparative moral psychology, participants who use relational categories showed a greater willingness to anticipate the animal's potential suffering, increasing the likelihood of preventive behaviors such as regular veterinary care and sterilization (Prato-Previde et al., 2022). In other words, while the category of “owner” describes a dynamic unilateral power, the guardianship paradigm operates as a bidirectional normative and emotional bond in which the satisfaction of the animal's needs constitutes a central axis of the responsible person's moral identity.

The impact of the terminological shift extends to the social sphere as well. Several multicenter studies conducted in Latin America demonstrate that institutional linguistic frameworks shape community norms and patterns of caregiving behavior (Mota-Rojas et al., 2023; Piermattei et al., 2024). Cities that have systematically incorporated the notion of guardianship or caregiving into educational campaigns, regulations, and health programs report significant increases in citizen participation in vaccination, registration, reporting of abuse, and sterilization processes (Beach et al., 2022). Conversely, territories where discursive models based on ownership persist exhibit higher rates of functional abandonment and uncontrolled reproduction. The phenomenon is explained in the literature as the “cultural normalization of functional detachment,” whereby the relationship with the animal shifts toward utilitarian logics when the linguistic category suggests availability and replaceability (Bicalho et al., 2024). In Ecuador, the relevance of this phenomenon is intensified by pronounced socioeconomic and territorial disparities, which condition access to veterinary care, responsible ownership practices, and the institutional enforcement of animal welfare regulations. Municipal observations have documented that peri-urban and urban-marginal sectors with a higher prevalence of possessive discourse are also those that exhibit a higher incidence of abandonment, violence, and unregulated breeding, suggesting that institutional language is a modulator of social behavior and not a simple neutral descriptor (Cornish et al., 2016).

The practical implications of this shift in conceptual framework are clear in public health and territorial governance. Contemporary epidemiological literature indicates that population control and zoonosis prevention programs demonstrate significantly improved outcomes when responsibility for the animal is conceptualized in terms of explicit co-responsibility between citizens and the state (Langlois et al., 2025). The term “guardian” allows for the operationalization of specific obligations (registration, vaccination, sterilization, and monitoring) and facilitates traceability in cases of abandonment or zoonotic transmission, reducing the administrative burden of municipal oversight (Balogh et al., 2023). Ecuador currently faces a critical transition in animal welfare governance due to the implementation of the Organic Law on Animal Welfare (2022), which requires greater conceptual and institutional coherence in the regulation of human–animal relationships. The situation remains hampered by the ambiguity of possessive language, which fails to clarify enforceable duties and allows for the informal transfer of animals without sanitary control, a situation widely documented in large cities (Kauffman and Martin, 2018). In this regard, incorporating

the relational category would not only align legislation with the constitutional mandate for nature protection but would also strengthen the operational capacity of local governments, particularly in jurisdictions with limited public health infrastructure (Enlund et al., 2020).

Contrary to the common belief that the guardianship model is culturally “elitist” or “restrictive”, recent anthropological and ethnographic studies indicate that Indigenous and peasant communities do not resist this relational framework, provided it is grounded in notions of reciprocity and co-responsibility, which are elements present in traditional worldviews that do not regard animals as replaceable commodities, but rather as beings integrated into familial, productive, or spiritual structures (Calle Alzate, 2025). Such evidence suggests that terminological shifts have the potential to reduce territorial inequalities, rather than exacerbate them, if communication and regulatory strategies recognize the country's cultural plurality. Linguistic change, therefore, becomes a tool for epistemic and territorial justice, insofar as it promotes relational models consistent with diverse cultural rationalities, avoiding the imposition of decontextualized urban meanings.

The integrative analysis of the available evidence suggests that the conceptual shift toward responsible guardianship not only resolves a regulatory inconsistency but also acts as a social technology capable of transforming public ethics, community behaviors, and the effectiveness of animal welfare health policies in Ecuador (Calandrini and Almeida, 2026). Terminological decisions shape the distribution of responsibilities, the design of institutional policies, and the symbolic frameworks through which society evaluates the acceptability of neglect and mistreatment (van der Staay et al., 2025). From a scientific perspective, maintaining possessive terminology perpetuates a relational model associated with poorer health, ethical, and community outcomes, whereas adopting relational terminology contributes to greater coherence between legal frameworks, public health strategies, and contemporary animal welfare evidence (Meisner et al., 2024).

PATHOLOGICAL ANTHROPOMORPHIZATION AND POSITIVE ANTHROPOGENIZATION OF PETS

The contemporary trend of attributing human emotions, intentionality, and psychological traits to companion animals, termed anthropomorphization in the specialized literature, requires urgent critical review. It has traditionally been assumed that “humanizing” animals has homogeneous and generally positive effects; however, recent empirical evidence demonstrates that not all forms of anthropomorphization produce the same results in terms of animal welfare, public health, ethical responsibility, or social coexistence (Meisner et al., 2024). Thus, it is necessary to conceptually differentiate the ways of “humanizing” pets, since some strengthen animal well-being and social co-responsibility, while others generate detrimental effects that translate into behavioral, health, and regulatory dysfunctions. It is also necessary to analytically distinguish between pathological anthropomorphization and positive anthropogenization (Vezirian, 2022). The former refers to a dysregulated projection that turns the animal into a human substitute or an object of maladaptive and functionally regressive affective relationships; the second describes an informed humanization, attentive to ethological and biosocial evidence, that reconfigures ownership practices toward models of co-responsibility and care that respect the animal's biology and best interests. This distinction is not merely semantic, as it has observable causal consequences in animal and human health indicators, management practices, and policy formulation.

It is also necessary to analytically distinguish between pathological anthropomorphization and positive anthropogenization, as these processes differ significantly in their conceptual basis, practical implications, and impact on animal welfare.

As shown in Table 2, pathological anthropomorphization is primarily driven by emotional projection and may result in practices that compromise animal health and behavior, whereas positive anthropogenization is grounded in scientific evidence and promotes responsible, welfare-oriented interactions.

Table 2. Comparative framework between pathological anthropomorphization and positive anthropogenization

Dimension	Pathological anthropomorphization	Positive anthropogenization
Conceptual basis	Emotional projection of human traits	Evidence-based relational understanding
View of the animal	Human substitute or symbolic object	Sentient being with specific needs
Care practices	Overfeeding, confinement, and misinterpretation of behavior	Ethological care, proper diet, and behavioral respect
Welfare impact	Increased stress, health problems	Improved physical and emotional well-being
Human motivation	Emotional dependency or substitution	Ethical responsibility and co-responsibility
Public health impact	Increased zoonosis risk, poor management	Better compliance with vaccination and control programs
Policy relevance	Leads to ineffective or harmful practices	Supports sustainable animal welfare policies

Pathological anthropomorphization is characterized by the emotional instrumentalization of the bond, whereby the animal comes to play roles that overburden its well-being, such as an unregulated therapeutic surrogate, an exclusive commensal with inappropriate diets, or a “child” whose behavior is interpreted solely through human psychological categories. Excessive anthropomorphic interpretations may promote management practices that are inconsistent with species specific behavioral and physiological needs, including inappropriate feeding, restriction of natural behaviors, and misunderstandings of behavioral signals. Such practices have been identified as potential risks to animal welfare when human expectations supersede ethological requirements (Serpell, 2003; Bradshaw et al., 2009). Recent studies have also shown that anthropomorphism is associated with the attribution of human emotions, intentions, and social roles to companion animals (Bouma et al., 2023).

In contrast, positive anthropogenesis is a deliberate and normative process. It involves incorporating elements of human understanding, such as empathy, recognition of agency, and moral consideration, in dialogue with animal cognition and welfare rather than replacing animal cognition and welfare. A productive form of “humanizing” requires redefining ownership practices to address ethological needs (exercise, cognitive stimulation, appropriate diet, socialization) while simultaneously recognizing legitimate emotional bonds that, if managed knowledgeably, enhance adherence to preventive measures (vaccination, registration, sterilization) and lead to better public health outcomes (a reduction in the number of stray dogs and improved epidemiological traceability; Bouma et al., 2023). Multicenter literature showed that frameworks that emphasize co-responsibility rather than ownership promote higher rates of health compliance and community participation, suggesting that informed humanization can be a lever for positive intervention (Forbes, 2018).

This dual typology allows us to dismantle myths, as not all humanization is harmful and not all dehumanization is benign (Golossenko et al., 2023). From a critical perspective, pathological anthropomorphization is not an act of elevated affection, but rather the reconfiguration of old power asymmetries under a contemporary emotional aesthetic (Butterfield et al., 2012). In urban environments, this form of relationship often emerges as a compensatory mechanism for emotional voids or human social deficiencies, and in doing so, it establishes dynamics of control over the animal that ultimately erode its well-being (Bradshaw and Casey, 2007). Instead of promoting autonomy and environmental conditions compatible with its species, the relationship is organized around the human need for emotional possession, which legitimizes harmful practices such as prolonged confinement in indoor spaces, the imposition of diets geared toward appearance rather than health, or aesthetic and reproductive interventions without medical or ethological justification (Serpell and Serpell, 2002). A form of anthropomorphization, far from elevating the animal's moral status, subordinates it to the symbolic expectations of the guardian, producing an apparent well-being that masks structural suffering (Mota-Rojas et al., 2021). Furthermore, certain forms of close human–animal interaction and inappropriate management practices, including inadequate feeding, insufficient hygiene measures, and poor parasite control, may increase the risk of zoonotic disease transmission and generate challenges for public and veterinary health systems (Overgaauw et al., 2020). Anthropomorphic perceptions can reinforce some of these practices when human emotional expectations take precedence over species specific biological and welfare requirements. Similar concerns have been highlighted in recent reviews examining the intersections among anthropomorphism, human health, and municipal health management (Nardi et al., 2025).

From a theoretical and methodological perspective, it is useful to approximate pathological anthropomorphization and positive anthropogenization using measurable indicators. Four evaluation axes could be proposed, encompassing ethological adjustment as the degree to which care practices respect natural behavioral repertoires and circadian rhythms, objective health including morbidity, mortality, zoonosis records, and the use of veterinary services, normative coherence understood as the correspondence between legal or municipal language (“guardian” versus “owner”) and recorded practical obligations, and relational sustainability defined as the stability of the bond without pathological burdens, measured using attachment and cohabitation scales. Each axis can be operationalized using validated instruments (anthropomorphism scales, health records, local policy audits, and ethological sampling), allowing for the evaluation of whether a policy or public campaign is promoting positive anthropogenization or fostering pathological anthropomorphization. These methodological proposals connect psychometric evidence with epidemiological data and policy analysis, following a One approach Expanded Health (Prato-Previde et al., 2022).

Scientific progress involves recognizing limitations and potential unintended consequences, such as positive anthropomorphism, which, if not linked to territorial equity policies, can remain confined to urban settings and marginalize legitimate rural or community practices. Furthermore, the psychology of pet attachment can lead people to resist welfare measures when they perceive them as restrictions, for example, when access to certain spaces is limited or when new rules of coexistence are imposed. Therefore, an applied research protocol is proposed based on pilot studies conducted in heterogeneous cantons, incorporating pre- and post-intervention measurements using anthropomorphism and welfare scales, analysis of municipal health indicators, and a qualitative ethnographic evaluation to capture local

interpretations of the terminological shift. Only through robust empirical evidence can it be validated that positive anthropomorphism is a sustainable strategy and not simply a new form of anthropomorphism with a benevolent label (Whiting, 2011).

COMPANION ANIMALS IN SOCIAL, EMOTIONAL, AND WELFARE CONTEXTS

The conception of companion animals as mere objects of ownership has been profoundly questioned in recent decades (Pongrácz and Dobos, 2023). Various disciplines have documented, using different methodologies and with varying degrees of rigor, the psychosocial, emotional, and community effects that emerge from the human-animal bond (McNicholas and Collis, 2000; Purewal et al., 2017). In this context, the term "companion animal" has evolved, establishing itself not only as an emotional luxury but also as a potential agent in promoting well-being, sociability, and emotional support, particularly in urban environments where alienation may be prevalent (Holland et al., 2022).

Kretzler et al. (2022), in a systematic review on pet ownership, loneliness, and social isolation, reported that pet ownership in adults was generally associated with lower levels of perceived loneliness and social isolation, particularly during the COVID-19 pandemic. Similar findings were observed by Kogan et al. (2021), who documented lower levels of depression, anxiety, and perceived isolation among dog and cat caregivers during lockdown periods, together with improved maintenance of daily routines and psychological well-being. However, Mueller et al. (2021) did not identify a universal protective effect in adolescents, suggesting that the potential benefits of pet companionship depend on contextual and individual factors, including the quality of the human-animal bond, living conditions, emotional attachment, and social environment. Consequently, current evidence supports a conditional rather than universal effect of pet companionship on emotional well-being and social connectedness (Azkona, 2025; Li and Wong, 2025).

During the pandemic, multiple studies reported that dogs and cats were associated with lower levels of depression, anxiety, and perceived isolation, while also supporting the maintenance of daily routines and a sense of purpose, particularly among young women with a close attachment to their pets (Zachariadou and Tragantzopoulou, 2025). However, current empirical evidence remains inconsistent across populations and study designs. A recent study focused on individuals diagnosed with severe mental disorders, such as bipolar disorder and psychosis, found no significant differences in well-being, depression, anxiety, or loneliness between those who had pets and those who did not (Barr et al., 2024). The authors caution that the perceived emotional bond with pets is not enough to guarantee well-being, as factors such as material costs and the stress of care, as well as housing conditions and prior mental health, play a determining role (Northrope et al., 2025). Furthermore, a longitudinal analysis of a national cohort revealed that, in certain subgroups, cat ownership was associated with increased social isolation and loneliness, particularly among men; in contrast, dog ownership was linked to lower levels of life satisfaction in women (Hansen et al., 2024). This demonstrated that the effects of pet ownership can vary according to gender, animal species, family structure, and life trajectories, highlighting the need for caution when generalizing universal benefits (Zhao et al., 2025).

From a social perspective, companion animals have also been analyzed as facilitators of social cohesion (Ru et al., 2025). In many urban neighborhoods, dog walks generate chance encounters between neighbors, promote socialization, increase the sense of community, and, in some cases, act as catalysts for informal support networks, especially in societies where urbanization and social fragmentation erode traditional bonds (Wang, 2023). This sociocultural role has been identified as an important element for understanding the function of pets in contemporary modernity.

From the fields of ethology and animal welfare, it has also been suggested that responsible pet ownership, including vaccination, health checks, adequate space, and respect for the specific needs of each species, can be an important factor in public health (Tayde, 2025). Responsible pet ownership, coupled with education, can prevent negative effects such as abandonment, mistreatment, overpopulation, animal stress, and the transmission of zoonotic diseases (Overgaauw et al., 2020). Several recent reviews on the "human-animal relationship" propose that ethical and informed coexistence can benefit both humans and animals, contributing to a multispecies welfare model (Gonçalves and Cerqueira, 2024). However, current evidence is limited by significant methodological and contextual variability. Methodological heterogeneity (cross-sectional versus longitudinal studies, self-reporting versus representative sampling), cultural differences between countries, the scarcity of studies in diverse Latin American and socioeconomic contexts, as well as the variability among species and their contextual specificities, all affect the external validity of the findings (Gvirtz and Sabherwal, 2024). It implies that any assertion must be nuanced, as pets can function as companions, but this depends on specific conditions. Thus, when considering the figure of the "companion animal" in contexts such as Ecuador, the debate cannot be limited to an affective idealization. It is essential to adopt a critical, interdisciplinary, and empirical perspective that recognizes the complexity of the phenomenon, as individual, structural, cultural, and animal welfare variables must be an integral part of this analysis (Jacobsson and Hansson, 2014). Such an approach demands a situated analytical framework that includes representative surveys, comparative longitudinal studies, gender and territorial context analysis, public policy evaluation, health and ethological monitoring, and multidimensional (human-animal)

welfare monitoring. Only through such methods can the true dimension of the human-animal bond be rigorously assessed, especially in Ecuador and Latin America.

ANIMAL WELFARE GOVERNANCE IN ECUADOR

The shift from possession to relational guardianship and the ethical importance of language in shaping human behavior toward animals inevitably leads to a critical issue, namely, the governance of animal welfare in Ecuador. The actual effectiveness of regulations can only be understood by analyzing how institutions translate (or fail to translate) this conceptual transition into sustainable public policies. In operational terms, governance becomes the arena where terminological change, positive anthropogenesis, and public ethics must be realized (Cornish et al., 2016).

Ecuador has made rapid progress in legislative production since the 2008 Constitution, which recognized nature as a subject of rights and laid the groundwork for the creation of the [Organic Law on Animal Welfare \(2022\)](#), in addition to numerous municipal ordinances related to the care, registration, and prevention of animal abuse (Wuraola and Wuraola, 2025). This legal framework has placed the country in a prominent position in the region, in line with international trends in the legal protection of animals (Lostal et al., 2024). However, the contrast between legal development and practical application reveals a persistent pattern of structural inconsistency: legislation is passed quickly, but the necessary institutional and sociocultural conditions to transform citizens' practices are not in place.

Territorial policy evidence reveals a regional disparity. In the Sierra region, policies focus on controlling the population of stray dogs, while on the Coast, public health interventions and zoonotic diseases predominate (Jiménez-Quito and Durán-Ramírez, 2024). In the Amazon, regulatory initiatives show significant shortcomings, partly because they ignore traditional human-animal management models present in Indigenous worldviews (Kelsey and Gilbert, 2023). These findings suggest that the country's cultural and socioeconomic heterogeneity is not being addressed by a flexible and participatory regulatory framework. Instead, regulations are designed from a centralized perspective that assumes animal welfare is a homogeneous phenomenon, when it is configured differently in each territory (Fernandes et al., 2019). Adding to this fragmentation is another critical factor, namely the political motivations underlying the creation of regulations. Various local ordinances have been driven by agendas of political visibility rather than by in-depth empirical analyses, resulting in performative legislation. This phenomenon has already been described in environmental governance and is now being replicated in animal welfare, where laws are enacted to convey public commitment, not necessarily to address complex social challenges (Lostal et al., 2024). The result is an overproduction of regulations with low adherence and limited real impact. Such evidence aligns with the findings in Quito, where, despite having an advanced ordinance on animal welfare, abandonment rates remain critical due to insufficient internalization of the regulations, rather than a lack of regulations altogether (Consejo de Protección de Derechos del DMQ, 2023).

Comparative analysis indicates, however, that the gap between legislation and outcomes can be reduced and is not an inherent feature of regulatory systems. In Ecuador, studies on collaborative sterilization campaigns between academia and animal welfare organizations show significant improvements in participation rates and health coverage when regulatory implementation is accompanied by community education and citizen participation (Rodríguez-Pazmiño et al., 2024). This result aligns with patterns described in international studies showing that adherence to animal welfare regulations increases when citizens perceive ethical co-responsibility rather than punitive imposition (Mellor and Uldahl, 2025).

Therefore, animal welfare governance in Ecuador cannot be evaluated solely in legal terms. Its progress and limitations can only be understood when three variables are considered simultaneously, namely the ethical internalization of the new relational paradigm of guardianship, the sociocultural and territorial factors that shape the perception of what it means to “care” for an animal, and the institutional capacity to translate regulatory development into sustained, funded, and evaluated policies. Where these three dimensions align, the results are positive, whereas where they diverge, citizen resistance, weak regulatory implementation, and a decline in animal welfare indicators emerge.

Ecuador has built an ambitious legal framework but has not yet established a governance system fully consistent with it (Foundation, 2025). The transition to relational guardianship and positive anthropogenesis will only be effective if public policies incorporate territorial participation, intercultural justice, stable funding, ongoing training for municipal officials, and evaluation (Messely et al., 2013). Without processes of ethical and cultural internalization, legislation becomes a dead letter; when such processes are present, animal welfare governance can become a tool for social cohesion, public health, and multispecies justice (Szydlowski et al., 2023).

EDUCATION AS AN ALTERNATIVE IN THE FIGHT AGAINST ANIMAL ABUSE

The fight against animal abuse in Ecuador reveals a critical disconnect between the creation of regulations and the cultural transformation necessary for their effective implementation. Although regulatory policies are essential, their inadequacy is evident in the persistently high rates of animal abuse, which reflect not only the challenge of regulation but

also a crisis of values and understanding regarding the human-animal relationship. Ajzen's theory of planned behavior (1991) suggests that behavior modification cannot be achieved solely through normative coercion; a transformation in the subjective attitudes and norms that underpin action is imperative. In this sense, the mere existence of laws, such as the Organic Law on Animal Welfare (2022), becomes an empty exercise if it is not accompanied by an educational process that fosters empathy and social responsibility.

Critiques of current legislation must be grounded in rigorous ethical analysis and empirical evidence. Many of the regulations enacted in Ecuador lack a solid ethical foundation and are often driven by political trends or the need for public visibility, rather than by empirical analysis and a deep understanding of the sociocultural dynamics that affect animal welfare. The phenomenon, known as "performative legislation," results in a regulatory framework that fails to respond to local realities, thus perpetuating animal abuse and dehumanization (Doyle et al., 2021).

Cultural resistance, especially in indigenous and rural communities, presents a significant obstacle to the implementation of external regulations, as these often conflict with local worldviews and traditional human-animal relationships. These communities possess worldviews that integrate animals into their social and spiritual structures, which contrast with regulatory approaches that tend to be imposed from an urban and Western perspective. A lack of sensitivity to these cultural realities can lead to the rejection of laws not because they oppose animal protection, but because they do not resonate with their traditional values and practices (Garcia et al., 2022).

An integrated educational approach grounded in ethical and sociocultural dimensions emerges as a critical and necessary alternative. An integrated educational approach grounded in ethical and sociocultural dimensions emerges as a critical and necessary alternative. It is not simply a matter of informing on existing laws but of cultivating a deep understanding of the ethics of care and shared responsibility towards animals (Cardilini et al., 2026). Educational programs that integrate the principles of Sumak Kawsay (Good Living), which emphasize the interconnectedness of humans, animals, and nature, can be effective in transforming attitudes and behaviors. Studies suggest that educational interventions can reduce animal abuse by 25% to 35%, underscoring the effectiveness of an approach based on empathy and respect (Arias et al., 2024). However, criticism of education should not be ignored. It is often argued that educational initiatives are expensive and require resources that are unavailable in the context of economic constraints. Nevertheless, recent studies indicate that investment in education for the prevention of animal abuse is significantly lower than the costs associated with penalties for abuse, reinforcing the economic viability of these programs (Budolfson et al., 2024). Education, therefore, is not only an ethical imperative but also an economically viable strategy that can generate long-term benefits in terms of public health and animal welfare (Zemanova, 2023).

The shift in terminology from "owner" to "guardian" or "responsible caretaker" is more than a simple linguistic change; it is a philosophical act that reflects a shift in understanding of the relationship between humans and animals. This change can influence how responsibilities are distributed and obligations toward animals are perceived. Adopting language that promotes shared responsibility can foster greater empathy and a deeper commitment to animal welfare, thus transforming the culture of pet ownership in Ecuador (Nurse, 2024).

The fight against animal abuse in Ecuador requires a critical approach that goes beyond simply creating regulations. It is imperative to recognize the importance of comprehensive education as a means of cultivating a culture of respect and responsibility toward animals. Transforming attitudes and behaviors, supported by a coherent regulatory framework sensitive to cultural realities, can be the solution for achieving a sustainable change in the perception and treatment of animals in the country. In this context, education becomes an act of social and ethical justice that can contribute to building a more compassionate society, one that is more aware of its interconnectedness with all living beings.

DISCUSSION

Understanding the anthropomorphization of companion animals in Ecuador requires situating the phenomenon within an interpretive framework that simultaneously articulates ethical, legal, sociocultural, and cognitive-ethological dimensions (Prato-Previde et al., 2022). Although the country has experienced a significant expansion of the discourse on animal welfare in recent years, particularly since the Constitution of the Republic of Ecuador (2008) and, more recently, the Organic Law on Animal Welfare (Ley Orgánica de Bienestar Animal, 2022). The conceptual discussion regarding the status of animals in Ecuadorian social life remains in its early stages. This insufficiency stems not from a lack of social awareness but rather from the absence of a systematic dialogue between international scientific evidence and local cultural particularities.

Understanding the anthropomorphization of companion animals in Ecuador requires situating the phenomenon within an interpretive framework that integrates language, cognition, legal structures, and sociocultural dynamics. Figure 1 illustrates this conceptual model, highlighting how these interacting dimensions can lead to divergent outcomes,

ranging from positive anthropogenization to pathological anthropomorphization, with corresponding effects on animal welfare, public health, and governance.

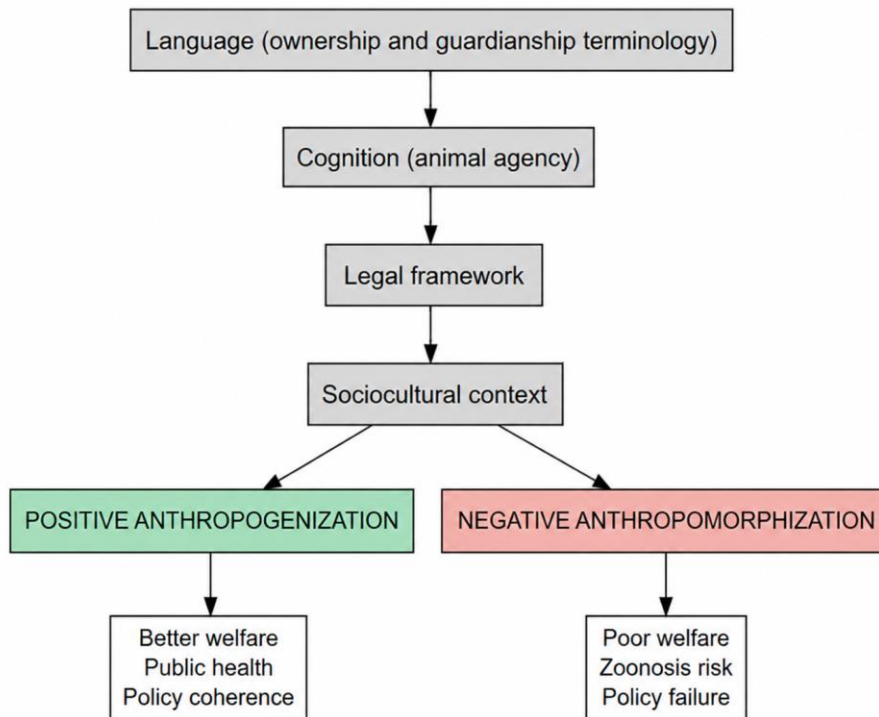


Figure 1. Conceptual model of anthropogenization and its implications for animal welfare and governance in Ecuador

One of the most consistent findings in international literature is that the moral recognition of companion animals does not emerge simply from affection or prolonged cohabitation, but from a deeper epistemological transformation, namely the understanding that dogs and cats possess cognitive, emotional, and relational capacities that position them as subjects with their own interests (Berger-Meunier et al., 2025). Although this discussion has received less attention in Ecuador, evidence such as Villamar's (2023) suggests that citizens intuitively recognize many of these attributes, even though regulations and public policies have not fully internalized their implications. The contradiction between the affective recognition of animals as family members and the persistence of legal categories that conceive of them as objects of property thus constitutes the core of a structural normative dissonance that permeates the entire animal welfare system.

Anthropogenization, understood as the process by which animals acquire social, affective, and moral meanings that transcend the logic of ownership, highlights this tension (Mota-Rojas et al., 2021). In countries such as Ecuador, where modernity has been unevenly superimposed and where traditional views coexist with emerging urban sensibilities, anthropogenization is not a homogeneous phenomenon but rather a deeply stratified one. In middle-class urban sectors, for example, the bond with animals tends to adopt characteristics of secure attachment, mutual emotional recognition, and a growing tendency toward responsible cohabitation, as Jiménez-Quito and Durán-Ramírez (2024) have pointed out. However, in urban-marginal and rural areas, the relationship is shaped by economic, territorial, and cultural dynamics that require more complex interpretations. As noted by Méndez Juez et al. (2020) and Monsalve et al. (2023), structural inequalities and material limitations condition the real possibilities of care, meaning that individual responsibility cannot be analyzed in isolation from living conditions.

The point challenges a recurring error in regulatory literature, namely the attempt to apply a universal model of responsible pet ownership that fails to consider cultural diversity or socioeconomic tensions. In Ecuador, the implementation of public policies focused exclusively on punitive regulations has proven insufficient, as documented by the Council for the Protection of Rights of the Metropolitan District of Quito (Consejo de Protección de Derechos del DMQ, 2023). The notion of “responsibility” cannot be imposed as an abstract duty, as it is contingent upon the availability of veterinary services, community education, public infrastructure, and mechanisms for citizen participation. International experience confirms that coercive approaches systematically fail when not accompanied by sustained educational and community processes (Rodríguez Ferrere, 2022). Such a pattern is particularly evident in Ecuador, where the Organic Law on Animal Welfare, despite its historical importance, still operates within a weak institutional framework, without the necessary tools to transform entrenched practices.

A central element of the discussion concerns how language shapes the conceptualization of human–animal relationships. The persistence of terms such as “custodian” or “proprietor” in Ecuadorian law is not merely a legal anachronism but a conceptual framework that organizes practices, emotions, and relational expectations. Psycholinguistic literature has conclusively shown that words not only describe reality but also produce it, as those who see themselves as “owners” tend to engage in more utilitarian and less empathetic practices, while those who define themselves as “guardians” internalize ethical and affective co-responsibility (López-Cepero et al., 2025). This poses a profound challenge for national legislation. The transition from ownership to guardianship is not only a legal matter but also a cultural one. Without a change in terminology and, therefore, in the cognitive framework that structures the relationship, any attempt at reform will be partial and incomplete.

The role of language in shaping human–animal relationships is closely linked to broader debates about the place of animals within the political community. Although the Ecuadorian Constitution has recognized the rights of nature since 2008, several authors warn that this constitutional recognition has not necessarily translated into effective protection for animals, due to normative vagueness, limitations in sub-constitutional legislation, and a still-developing body of jurisprudence (Lazo, 2023). The discussion becomes more complex when recognizing that companion animals inhabit domestic, familial, and urban environments rather than wild ecosystems, which introduces distinct ethical tensions in their regulation (Rouhiainen and Aarnio, 2025). While the theory of the rights of nature seeks to preserve ecological processes, the theory of animal welfare focuses on individual agency and the subjective experience of each animal (Peschel et al., 2025). Anthropogenization, in this sense, introduces a nuance, as it recognizes animals as participants in human social networks, which places them in a hybrid space between the biological, the emotional, and the political (Azadi et al., 2022).

Anthropogenization must incorporate the issue of pathological anthropomorphization, a phenomenon that emerges when affective recognition overflows into practices that ignore the real ethological needs of animals (Araújo et al., 2024). Adamakopoulou et al. (2023) have warned that the excessive attribution of human characteristics to animals can be as harmful as traditional objectification, as it leads to decisions that compromise the animal's well-being. In Ecuador, where the commercial supply of pet products and services has expanded rapidly, such a phenomenon is beginning to be observed, especially in middle-class urban areas. The scientific discussion, therefore, emphasizes the need for balance: recognizing the animal's subjectivity without projecting human expectations onto it that distort its well-being. Furthermore, the phenomenon of anthropogenization raises critical questions about whether current veterinary curricula in Ecuador and Latin America adequately prepare students for emerging professional challenges. Historically, veterinary education in Latin America has heavily prioritized clinical, biological, and zootechnical competencies, often providing limited training in animal welfare science, veterinary ethics, legal frameworks, and advanced communication skills (Cornish et al., 2018; Ventura et al., 2020). As the human–animal bond evolves, veterinarians increasingly encounter complex ethical dilemmas and communicative tensions with guardians, including demands for overtreatment, humanized diets, or interventions that prioritize human emotional expectations over the biological needs of animals. Therefore, modernizing veterinary curricula through stronger interdisciplinary training is essential to equip future professionals with the ethical, legal, and communicative tools required to address these emerging challenges effectively.

The anthropization of animals in Ecuador is a complex phenomenon, shaped by historical, cultural, economic, and legal tensions. Understanding it requires recognizing that animal welfare is not an isolated practice or an individual responsibility, but rather a collective process demanding profound transformations in the conceptual, institutional, and cultural frameworks that underpin interspecies coexistence. Only to the extent that these transformations converge will it be possible to construct an Ecuadorian model of responsible guardianship that responds to both scientific evidence and local realities (Lostal Becerril et al., 2024).

CONCLUSION

The analysis shows that the anthropomorphization of companion animals in Ecuador is closely linked to linguistic, legal, and sociocultural factors that shape human–animal relationships. The persistence of possessive terminology reinforces utilitarian practices, whereas emerging relational approaches grounded in guardianship are associated with greater ethical responsibility and improved welfare outcomes. At the same time, the evidence reveals a significant gap between regulatory development and its effective implementation, influenced by territorial inequalities, limited institutional capacity, and insufficient cultural internalization of animal welfare principles. These findings highlight the need to integrate language reform, public education, and context-sensitive policies in order to achieve coherent and effective animal welfare governance. The value of this analysis lies in providing an interdisciplinary framework that clarifies how terminology, governance, and social practices interact in shaping interspecies coexistence in Ecuador.

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Authors' contributions

Orlando Meneses Quelal contributed to the conceptualization of the study, data analysis, and manuscript writing. The author also conducted the research activities and ensured the integration of interdisciplinary evidence. The author has read and confirmed the last edition of the manuscript before publication in the present journal.

Availability of data and materials

This study is prepared based on the previously published literature. All data supporting the findings are included in the article and its references.

Competing interests

The authors have declared no conflict of interest.

Ethical considerations

The author declares that ChatGPT (OpenAI) was used solely for translating the original text and for minor linguistic editing. The author confirmed that the use of AI did not contribute to the scientific content, analysis, or interpretation. The author assumes full responsibility for the content of the manuscript.

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