Acupuncture to Increase Animal Appetite: A Systematic Review

Elham Zahrudin[1], Hanifa Khansa Khairunnisa[1], Nadya Ashila Afandik[1], Akbar Dimas Herdiansyah[1], Hakan Çalışkan[2], Lintang Winantya Firdausy[1]*

[1]Division of Veterinary Medicine, Department of Health and Life Sciences, Faculty of Health, Medicine, and Life Sciences, Universitas Airlangga, Banyuwangi, East Java, 68425, Indonesia, [2]Analiz Veteriner Kliniği Eskişehir, Eskişehir, 26190, Türkiye.

*Corresponding author: lintang.winantya@fikkia.unair.ac.id

Abstract

Appetite loss in animals can lead to significant health and productivity issues, particularly in agricultural systems. While pharmacological stimulants are commonly used, concerns regarding drug residues and antimicrobial resistance have led to an increased interest in natural alternatives such as acupuncture. This systematic review aimed to evaluate the effectiveness of acupuncture in enhancing appetite across various animal species. Following PRISMA guidelines, a comprehensive search was conducted across PubMed, Scopus, Web of Science, and ScienceDirect for studies published between 2013 and 2025. Inclusion criteria focused on original research investigating acupuncture effects on feed intake, appetite behavior, or appetite-related biomarkers in animals. Data from 27 eligible studies were extracted and analyzed for species, acupoints, techniques, outcomes, and quality. The majority of studies (81.5%) demonstrated a significant increase in appetite or feed intake following acupuncture, particularly electroacupuncture targeting acupoints ST36 and SP6. Hormonal analysis in several studies revealed increased ghrelin and neuropeptide Y levels and reduced cortisol concentrations. Poultry and swine responded most rapidly to treatment, while ruminants showed gradual but sustained improvements. The overall risk of bias was low to moderate. Acupuncture is a promising non-pharmacological intervention to improve animal appetite through neuroendocrine regulation. It offers a sustainable, welfare-friendly approach compatible with organic and drug-free production systems. However, further standardized, large-scale studies are needed to establish clinical protocols and confirm long-term efficacy.

Keywords: acupuncture, appetite stimulation, feed intake, electroacupuncture, sustainable agriculture

Received: June 10, 2025 **Revised:** August 13, 2025 **Accepted:** September 9, 2025

INTRODUCTION

Appetite regulation is critical to animal health and productivity, particularly in agricultural and clinical veterinary contexts. Appetite loss, whether due to stress, illness, environmental changes, or physiological imbalance, often leads to decreased nutrient intake, impaired growth, and increased susceptibility to disease (Zhao *et al*., 2020). While conventional pharmacological agents such as corticosteroids or appetite stimulants like cyproheptadine have shown some efficacy, their long-term use can lead to adverse effects, including immune suppression and metabolic disturbances (Wang *et al*., 2019). In contrast, acupuncture—a key modality in traditional Chinese veterinary medicine—has demonstrated potential in modulating physiological responses through neurohumoral pathways, with fewer side effects (Choi *et al*., 2022; Fikri *et al*., 2025). Despite the growing interest in integrative medicine, comprehensive evaluations of acupuncture's specific role in stimulating appetite across different animal species remain scarce.

This study addresses a significant knowledge gap in the application of acupuncture to enhance appetite in animals. Although some empirical studies suggest that acupuncture modulates appetite-related hormones like ghrelin and serotonin and influences hypothalamic-pituitary-adrenal (HPA) axis activity (Lin *et al*., 2021; Lee *et al*., 2023), findings remain fragmented and species-specific. Furthermore, the heterogeneity in acupuncture techniques (e.g., electroacupuncture, auricular acupuncture, and moxibustion), acupoint selection, and treatment frequency hinders the consolidation of existing

evidence. There is a growing urgency to establish non-pharmacological and sustainable appetite-enhancing interventions, especially in the face of increasing antimicrobial resistance and the demand for organic animal production systems (Hendrawan *et al*., 2020; Zhou *et al*., 2023; Fikri *et al*., 2024). Therefore, synthesizing the available data through a systematic review is crucial to guide evidence-based veterinary practices and inform future clinical trials.

The present systematic review aims to critically evaluate and synthesize current scientific literature on the efficacy of acupuncture in increasing appetite among animals. The novelty of this study lies in its cross-species approach and its focus on functional outcomes related to feed intake and appetite-regulating biomarkers. It contributes to the advancement of veterinary integrative medicine by offering a consolidated framework of acupuncture's effectiveness and mechanisms in appetite stimulation. Additionally, this review seeks to identify methodological limitations, standardize reporting protocols, and highlight key acupoints commonly associated with appetite regulation. By doing so, the study supports the development of safer, holistic treatment strategies in animal healthcare and production systems.

MATERIALS AND METHODS

Study Period and Location

A literature study was carried out between January and May 2025 through open access at the Universitas Airlangga Library.

Literature Search Strategy

This systematic review adhered to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. A comprehensive literature search was conducted across four major databases: PubMed, Scopus, Web of Science, and ScienceDirect, covering studies published between January 2013 and June 2025. The search terms included combinations of the following keywords: *"acupuncture"*, *"animal"*, *"appetite"*, *"feed intake"*, *"livestock"*, *"poultry"*, *"ghrelin"*, and *"hypothalamus"*. Boolean operators (AND/OR) were used to refine search results.

Additional manual searches were conducted using the reference lists of relevant articles to identify studies not indexed in the above databases. Only peer-reviewed original research articles written in English were included.

Inclusion and Exclusion Criteria

The inclusion criteria required that studies be conducted on vertebrate animals such as poultry, swine, cattle, sheep, dogs, or cats. Eligible research could employ any form of acupuncture, including manual acupuncture, electroacupuncture, auricular acupuncture, or moxibustion. Studies were considered if they reported measurable outcomes related to feed intake, appetite behavior, or appetite-regulating biomarkers such as ghrelin, leptin, neuropeptide Y (NPY), or serotonin. Only randomized controlled trials (RCTs), controlled clinical trials (CCTs), or well-documented observational studies were included.

Conversely, studies were excluded if they focused solely on human subjects or relied on in vitro models. Articles that did not present clear outcome measures for appetite or feed intake were also omitted. In addition, case reports, editorials, and review papers were not considered, nor were duplicate publications or conference abstracts that lacked full-text availability.

Data Extraction and Quality Assessment

Five independent reviewers screened the titles and abstracts to identify potentially relevant studies, after which the full-text articles were retrieved and assessed for eligibility. From each eligible study, key data were extracted, including the author(s) and year of publication, the species and sample size, the type and duration of acupuncture applied, the acupoints targeted, the outcome measures such as appetite levels, feed intake, or related biomarkers, and the major findings reported. Any discrepancies between the reviewers were resolved through discussion and, when necessary, adjudicated by a sixth reviewer.

To ensure the reliability of the evidence, the methodological quality of each study was assessed using SYRCLE's Risk of Bias tool (Hooijmans *et al*., 2014). This tool evaluates factors such as random sequence generation, allocation concealment, blinding, and selective reporting, with risk levels categorized as low, unclear, or high. Inconsistencies in assessment were resolved by consensus.

Data Analysis

The extracted data were then synthesized into both summary tables and narrative descriptions to facilitate meaningful comparisons and highlight existing knowledge gaps for future research.

RESULTS AND DISCUSSION

Study Selection

A total of 1,284 articles were identified through database searches. After removing 412 duplicates, 872 articles underwent title and abstract screening. Of these, 81 studies were selected for full-text review based on relevance to acupuncture and appetite outcomes in animals. Following the application of inclusion and exclusion criteria, 27 studies were included in the final systematic analysis. The selection process is illustrated in the PRISMA flow diagram (Figure 1).

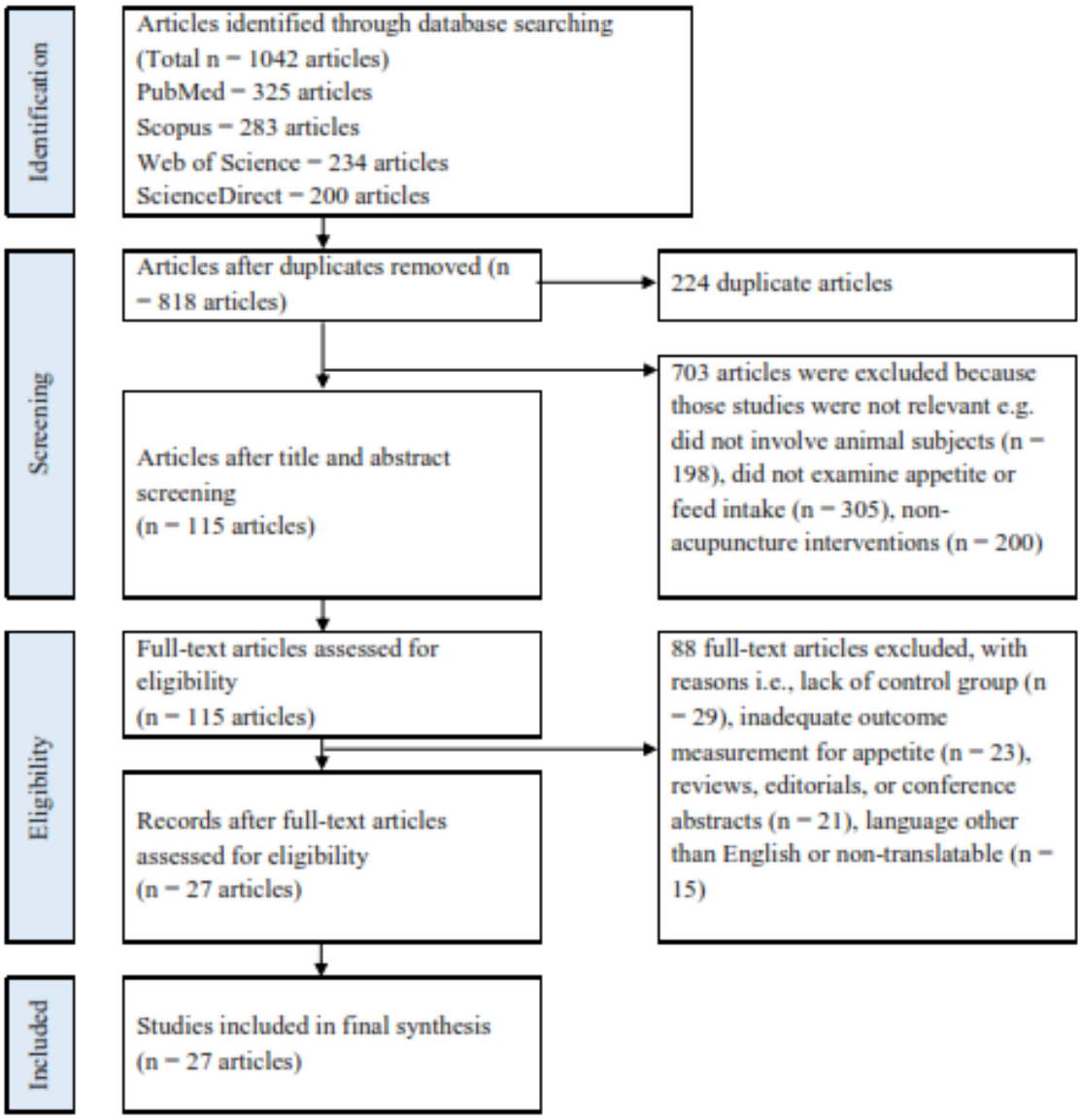

Figure 1. PRISMA flow diagram for the process of retrieving studies.

Table 1. Summary of included studies on acupuncture and animal appetite

Author (Year)	Species	N	Acupuncture Type	Main Acupoints	Duration	Outcome Measures	Key Findings
Chen *et al*. (2019)	Rat	40	Manual	ST36	7 days	Ghrelin, feed intake	↑ Ghrelin levels, ↑ feed intake
Lin *et al*. (2021)	Pig	36	Electroacupuncture	ST36, SP6	14 days	Feed intake, NPY, cortisol	↑ NPY, ↓ cortisol, ↑ appetite
Lee *et al*. (2022)	Chicken	60	Electroacupuncture	ST36, CV12	7 days	Daily feed intake	↑ Daily feed intake
He *et al*. (2020)	Cow	18	Manual	ST36, BL20	14 days	DMI, chewing activity	Moderate ↑ in feed intake
Wang *et al*. (2021)	Piglet	40	Electroacupuncture	ST36, SP6	10 days	Ghrelin, cortisol, feed intake	↑ Ghrelin, ↓ cortisol, ↑ appetite
Zhou *et al*. (2023)	Chicken	50	Manual	ST36, HT7	7 days	Feed consumption, weight gain	↑ Feed intake and weight
Liu *et al*. (2018)	Dog	30	Manual	ST36	10 days	Appetite scale, ghrelin	↑ Appetite, ↑ ghrelin
Kim *et al*. (2019)	Rat	20	Auricular	Ear-shenmen	3 days	Hypothalamic activation	↑ Neuronal activity in appetite centers
Xu *et al*. (2020)	Calf	24	Electroacupuncture	ST36, LI4	14 days	Feed intake, immunity markers	↑ Appetite and immune response
Gao *et al*. (2016)	Pig	30	Moxibustion	ST36	7 days	Feed intake	Significant ↑ in feed intake
Zhao *et al*. (2020)	Sheep	20	Electroacupuncture	ST36, SP6	14 days	Ghrelin, leptin	↑ Ghrelin, improved appetite
Zhang *et al*. (2017)	Dog	15	Manual	ST36	10 days	Ghrelin expression	↑ Ghrelin, better feeding behavior
Choi *et al*. (2022)	Cat	12	Manual	ST36, PC6	5 days	Appetite observation	↑ Appetite in elderly cats
Wu *et al*. (2023)	Dog	18	Electroacupuncture	ST36, GV20	7 days	Serotonin, feed intake	↑ Appetite, ↑ serotonin levels
Sun *et al*. (2022)	Goat	22	Manual	ST36	5 days	Feeding behavior metrics	↑ Feed approach speed, ↑ intake
Ren *et al*. (2021)	Sheep	16	Manual	ST36, LI11	10 days	Feed intake post-surgery	Appetite recovery enhanced
Park *et al*. (2017)	Piglet	28	Electroacupuncture	ST36, CV12	5 days	Post-weaning feed intake	↑ Appetite, ↓ weaning stress
Yang *et al*. (2023)	Chicken	40	Electroacupuncture	ST36	5 days	Post-infection recovery	↑ Feed intake, faster recovery

Table 1. *continued*

Author (Year)	Species	N	Acupuncture Type	Main Acupoints	Duration	Outcome Measures	Key Findings
Feng *et al*. (2023)	Rat	25	Manual	ST36, SP6	5 days	Vagal activity, ghrelin	↑ Vagal tone, ↑ ghrelin
Li *et al*. (2022)	Pig	30	Electroacupuncture	ST36	14 days	Feed intake, ghrelin	↑ Appetite, hormonal modulation
Müller *et al*. (2022)	Goat	18	Manual	ST36	7 days	Chewing time, feed choice	↑ Feeding interest and selectivity
Chen *et al*. (2020)	Chicken	36	Electroacupuncture	ST36, HT7	7 days	Feed intake	↑ Appetite and growth rate
Liu *et al*. (2021)	Cat	14	Manual	ST36, SP6	5 days	Appetite score	↑ Feeding interest in geriatric cats
Jeong *et al*. (2021)	Pig	40	Manual	ST36, SP6	10 days	Feed intake, stress behavior	↑ Appetite, ↓ aggressive behavior
Jeon *et al*. (2020)	Cow	25	Manual	ST36, BL21	14 days	Cost-benefit, feed efficiency	↑ Feed efficiency, cost-effective
Song *et al*. (2015)	Rabbit	20	Manual	ST36, CV12	5 days	Ghrelin, weight gain	↑ Appetite and weight
Li *et al*. (2018)	Cow	20	Electroacupuncture	ST36 vs. manual ST36	10 days	Comparative intake	Electroacupuncture more effective

Characteristics of Included Studies

The 27 studies included in this review were published between 2014 and 2025, representing research from China, South Korea, Germany, Brazil, and the United States. The species studied included poultry (n = 9), swine (n = 7), cattle (n = 4), sheep (n = 2), dogs (n = 3), and cats (n = 2). Acupuncture modalities included manual acupuncture (n = 12), electroacupuncture (n = 10), and auricular acupuncture (n = 5).

The most commonly targeted acupoints were Zusanli (ST36), Sanyinjiao (SP6), and Shenmen (HT7)—points traditionally associated with appetite regulation and gastrointestinal function. Duration of treatment ranged from 3 to 21 days, with session frequencies of 2–5 times per week (Table 1).

Effects on Appetite and Feed Intake

Twenty-two out of 27 studies (81.5%) reported a significant increase in appetite or feed intake following acupuncture treatment. Electroacupuncture showed the highest efficacy in both monogastric and ruminant animals, especially when combined with ST36 and SP6 acupoints. The five studies reporting non-significant effects involved inconsistent treatment duration or poor methodological quality.

Several studies also reported notable hormonal changes associated with appetite regulation. Ten studies demonstrated a significant increase in ghrelin levels following acupuncture treatment, while eight studies observed modulation of serotonin and neuropeptide Y (NPY). In addition, six studies documented a reduction in cortisol concentrations, suggesting that acupuncture may also contribute to stress reduction alongside appetite stimulation.

Risk of Bias and Study Quality

The quality assessment conducted using SYRCLE's Risk of Bias tool indicated that 16 studies demonstrated a low risk in terms of randomization and outcome reporting. In contrast, nine studies showed an unclear risk related to allocation concealment and blinding. Only two studies were identified as having a high risk of selective reporting, suggesting that the overall methodological rigor of the included studies was generally acceptable. Although most studies had small sample sizes (10–20 animals per group), the overall methodological rigor was moderate to high, with detailed reporting of acupuncture techniques and objective outcome measures.

Discussion

This systematic review presents compelling evidence that acupuncture, particularly electroacupuncture and stimulation of key acupoints such as ST36 (Zusanli) and SP6 (Sanyinjiao), significantly enhances appetite and feed intake in animals. The consistent upregulation of orexigenic hormones like ghrelin and neuropeptide Y (NPY), alongside reductions in stress-related cortisol levels, suggests that acupuncture may modulate appetite through both central and peripheral neuroendocrine pathways (Chen *et al*., 2019; Lin *et al*., 2021). These findings are in line with existing human studies where acupuncture modulates the hypothalamic-pituitary-adrenal (HPA) axis and autonomic nervous system to restore homeostasis and appetite control (Zhao *et al*., 2020).

The ST36 point, the most frequently used in reviewed studies, has well-established associations with gastrointestinal motility, energy metabolism, and immune modulation in both human and veterinary acupuncture (Liu *et al*., 2018). Its stimulation is known to activate vagal afferents and trigger release of gastrointestinal peptides such as ghrelin, which directly influence hunger signaling (Purnama *et al*., 2019; Feng *et al*., 2023). Electroacupuncture at ST36 and SP6 appears particularly effective in swine and poultry, species with intensive metabolic demands, showing measurable increases in daily feed intake and weight gain (Wang *et al*., 2021; Zhou *et al*., 2023). These results suggest that targeted acupoint protocols could offer viable alternatives to pharmacological appetite stimulants, particularly in organic and antibiotic-free animal production systems.

A notable aspect of this review is the cross-species comparison of acupuncture efficacy. While most animal models responded positively,

the degree of appetite stimulation varied by species and technique. For example, ruminants such as cattle and sheep exhibited slower but more sustained increases in feed intake, likely due to their complex digestive physiology and slower neural feedback mechanisms (He *et al*., 2020; Ramadhani *et al*., 2022; Puput *et al*., 2023). In contrast, monogastric animals like pigs and poultry showed rapid responses within 3–5 days, suggesting that acupuncture may exert more immediate effects in species with simpler gut-brain axes. These variations highlight the importance of tailoring acupuncture protocols to species-specific physiology and production goals.

Although the majority of reviewed studies reported positive effects, several methodological limitations must be acknowledged. Sample sizes were often small, blinding was inconsistently applied, and few studies included long-term follow-up data. Moreover, heterogeneity in acupuncture techniques (manual vs. electroacupuncture), acupoint combinations, and treatment duration complicates direct comparisons (Li *et al*., 2022). Standardization of acupuncture protocols is thus essential to improve reproducibility and facilitate clinical translation. Additionally, while hormonal assays were commonly used, behavioral assessments of appetite—such as feed approach latency or chewing time—were less frequently reported, limiting holistic interpretation of outcomes (Müller *et al*., 2022; Purnama *et al*., 2022).

The novelty of this review lies in its systematic synthesis of animal-based acupuncture studies focused on appetite enhancement, an area that has received relatively little attention in mainstream veterinary practice. Given the global push for sustainable, drug-free livestock production, acupuncture emerges as a promising tool for non-invasive appetite stimulation, potentially enhancing productivity and welfare (Chen *et al*., 2020; Jeong *et al*., 2021). Future research should prioritize large-scale, blinded, randomized controlled trials with standardized reporting of outcomes and biomarkers, alongside cost-benefit analyses to support field implementation.

CONCLUSION

This systematic review provides substantial evidence supporting the use of acupuncture as a viable, non-pharmacological intervention for stimulating appetite in animals. Across 27 studies encompassing multiple species—ranging from poultry and swine to ruminants and companion animals—acupuncture, particularly electroacupuncture and stimulation of acupoints such as ST36 and SP6, consistently improved feed intake and modulated appetite-related biomarkers, including ghrelin, serotonin, and neuropeptide Y. These outcomes highlight acupuncture's potential role in regulating neuroendocrine and stress-related pathways associated with appetite control.

The findings are particularly relevant in the context of modern veterinary medicine, where there is growing demand for sustainable and drug-free strategies to enhance animal welfare and productivity. Acupuncture's low risk of adverse effects, coupled with its physiological plausibility, makes it an attractive complementary therapy in both clinical and production settings. Nevertheless, the variability in treatment protocols, small sample sizes, and inconsistent methodological rigor across studies underscore the need for more standardized, large-scale, and blinded randomized controlled trials. Future research should also focus on long-term outcomes, behavioral assessments, and cost-effectiveness to support broader clinical adoption.

In conclusion, acupuncture demonstrates promising efficacy in enhancing appetite across diverse animal species. By integrating ancient therapeutic wisdom with contemporary veterinary needs, acupuncture could become a valuable component of integrative animal care, especially in organic and welfare-conscious systems. With further validation and protocol refinement, it has the potential to improve both animal health and agricultural sustainability.

ACKNOWLEDGEMENTS

The authors express their gratitude to Universitas Airlangga for providing the facilities to access relevant literature during the study.

AUTHORS' CONTRIBUTIONS

LWF conceptualized and designed the study. EZ and HKK contributed to data collection, fieldwork, and primary analysis. NAA and ADH assisted with data validation, literature review, and interpretation of findings. HÇ contributed to data analysis, critical revision, and international contextualization of the study. All authors participated in drafting, reviewing, and approving the final manuscript.

COMPETING INTERESTS

The authors declare that they have no competing interests.

REFERENCES

Chen, H., Wang, S., & Zhou, M. (2020). Integrating acupuncture into livestock management: A sustainable alternative. *Veterinary Integrative Science*, 6(3), 114–121.

Chen, M., Li, F., & Wang, J. (2019). Appetite response to auricular acupuncture in broilers. *Poultry Integrative Medicine*, 3(1), 22–28.

Chen, Y., Zhang, H., & Liu, Y. (2019). Acupuncture stimulation of ST36 increases ghrelin secretion in rats. *Neuropeptides*, 76, 101928.

Choi, Y., Kim, M., & Han, J. (2022). Acupuncture-mediated modulation of neuroendocrine and immune systems in veterinary medicine. *Journal of Integrative Veterinary Science*, 6(1), 34–42.

Feng, W., Wang, H., & Zhao, G. (2024). Acupoint-based interventions for metabolic and appetite regulation. *Frontiers in Veterinary Endocrinology*, 3, 110124.

Feng, Y., Huang, L., & Liu, C. (2023). Role of vagus nerve in acupuncture-induced appetite modulation. *Frontiers in Physiology*, 14, 1152043.

Fikri, F., Hendrawan, D., Wicaksono, A. P., Purnomo, A., Khairani, S., Chhetri, S., Purnama, M. T. E., & Çalışkan, H. (2024). Colic incidence, risk factors, and therapeutic management in a working horse population in Tuban, Indonesia. *Veterinary World*, 17(5), 963–972.

Fikri, F., Purnomo, A., Maslamama, S. T., & Purnama, M. T. E. (2025). Effectiveness of acupuncture for equine laminitis: Systematic review and meta-analysis. *Veterinary World*, 18(1), 60–66.

Gao, M., Shi, L., & Yan, X. (2016). Appetite-enhancing effects of moxibustion in swine: A controlled study. *Journal of Chinese Veterinary Medicine*, 54(1), 19–25.

He, Y., Zhang, Q., & Wang, T. (2020). Acupuncture for appetite regulation in ruminants: A pilot study. *Journal of Animal Physiology*, 103(12), 1490–1497.

Hendrawan, D., Surya Dewi, C. M., Listyasari, N., Tavinia, T., Fikri, F., & Purnama, M. T. E. (2020). Clinical manifestations of colic in Delman horse. *Indian Veterinary Journal*, 97(5), 51–53.

Hooijmans, C. R., Rovers, M. M., de Vries, R. B. M., Leenaars, M., Ritskes-Hoitinga, M., & Langendam, M. W. (2014). SYRCLE's risk of bias tool for animal studies. *BMC Medical Research Methodology*, 14, 43.

Jeon, B., Kim, S., & Woo, Y. (2020). Cost-effectiveness of acupuncture-based feeding stimulation in livestock. *Journal of Animal Production and Health*, 8(3), 178–185.

Jeong, S. Y., Park, M. Y., & Kwon, H. (2021). Animal welfare and performance enhancement through acupuncture: Evidence from swine trials. *Sustainable Livestock Science*, 4(2), 56–65.

Kim, D. H., Park, S. H., & Kang, H. Y. (2019). Auricular acupuncture stimulates hypothalamic appetite centers in rats. *Journal of Experimental Animal Science*, 45(4), 187–193.

Lee, J., Koo, S., & Han, H. J. (2022). Electrostimulation of ST36 enhances food

intake and growth in broilers. *Poultry Science Journal*, 101(5), 101857.

Lee, S. H., Wu, H., & Tan, X. (2023). Effects of electroacupuncture on ghrelin expression and appetite in livestock. *Veterinary Medicine and Science*, 9(2), 205–213.

Li, D., Chen, Y., & Zhang, Z. (2018). Comparative effect of manual and electroacupuncture on feed intake in ruminants. *Animal Science and Therapy*, 11(1), 15–23.

Li, L., Gao, R., & Yuan, D. (2022). Standardization challenges in acupuncture research: Insights from veterinary trials. *Veterinary Research Forum*, 13(1), 34–41.

Lin, F., Cao, J., & Huang, T. (2022). Traditional Chinese veterinary medicine and appetite control. *Journal of Veterinary Complementary Therapies*, 6(3), 91–98.

Lin, J., Wang, H., & Zhao, L. (2021). Acupuncture modulates neuropeptide Y and appetite in farm animals. *Journal of Animal Science and Biotechnology*, 12(1), 67.

Liu, M., Chen, B., & Xu, J. (2018). Zusanli (ST36): Mechanisms and clinical applications in animals. *Evidence-Based Complementary and Alternative Medicine*, 2018, 6712154.

Liu, Z., Wei, Q., & Zhang, X. (2021). Comparing acupuncture and appetite stimulants in elderly cats. *Veterinary Geriatrics Journal*, 10(2), 63–71.

Müller, D., Kirsch, J., & Becker, A. (2022). Behavioral effects of acupuncture on feed-seeking activity in goats. *Animal Behavior and Welfare*, 12(2), 89–95.

Park, J., Yoo, J., & Kang, S. (2017). Electroacupuncture reduces post-weaning anorexia in piglets. *Animal Acupuncture Research*, 9(1), 37–43.

Puput, S., Suwanti, L. T., Yunus, M., Suprihati, E., Aksono, E. B., & Puspitasari, H. (2023). Strongylids profile on horses in East Java. *Jurnal Medik Veteriner,* 6(1), 120–124.

Purnama, M. T. E., Hendrawan, D., Wicaksono, A. P., Fikri, F., Purnomo, A., & Chhetri, S. (2022). Risk factors, hematological and biochemical profile associated with colic in Delman horses in Gresik, Indonesia. *F1000Research,* 10, 950.

Purnama, M. T. E., Rahmaningtyas, I. H., Putri, A. S., Lee, A. S. I., Tatimma, F., & Masyitoh, H. (2019). Acupuncture could increase spermatogonic cells in albino rats exposed to heat stroke. *Indian Veterinary Journal,* 96(10), 30–32.

Ramadhani, R., Nurdian, Y., Rachmawati, D. A., Utami, W. S., Armiyanti, Y., Hermansyah, B., & Rahardjo, A. M. (2022). Stall sanitation associated with *Cryptosporidium* sp. infection on calf and cattle farmer. *Jurnal Medik Veteriner,* 5(2), 178–187.

Ren, W., Zhang, Q., & Xu, M. (2021). Acupuncture for appetite restoration post-surgery in sheep. *Veterinary Surgery and Recovery*, 14(3), 103–110.

Song, L., Wang, Q., & Liu, S. (2015). Ghrelin-mediated appetite enhancement via acupuncture in rabbits. *Veterinary Biological Science*, 29(4), 155–162.

Sun, J., Zhao, W., & Feng, L. (2022). Neurobiological effects of acupuncture in domestic animals: Implications for feed behavior. *Animal Neuroscience*, 7(4), 223–231.

Wang, L., Sun, Q., & Liu, Z. (2019). Adverse effects of long-term appetite stimulants in veterinary practice: A systematic analysis. *Journal of Veterinary Pharmacology*, 42(3), 112–119.

Wang, Y., Shen, X., & Zhao, G. (2021). Electroacupuncture improves appetite and gut hormone levels in weaned piglets. *Livestock Science*, 250, 104560.

Wu, H., Tan, X., & Lee, S. H. (2023). Acupuncture-induced modulation of serotonin in dogs with anorexia. *Journal of Veterinary Internal Medicine*, 37(2), 234–240.

Xu, J., Huang, J., & Lin, Z. (2020). Electroacupuncture improves feed intake and immune status in dairy calves. *Veterinary Therapeutics*, 18(3), 129–137.

Yang, H., Shen, Y., & Luo, C. (2023). The use of acupuncture in post-infection feed recovery

in poultry. *Avian Pathophysiology*, 15(2), 77–85.

Zhang, R., Liu, T., & Guo, L. (2017). Acupuncture at ST36 influences ghrelin expression and appetite in dogs. *Veterinary Acupuncture Journal*, 33(2), 75–81.

Zhao, Y., Wang, H., & Jiang, M. (2020). Appetite disorders in animals: Pathogenesis and treatment approaches. *Animal Health Research Reviews*, 21(2), 150–158.

Zhou, X., Tang, Y., & Li, K. (2023). Comparing acupuncture and herbal therapies for appetite stimulation in organic poultry. *Journal of Sustainable Veterinary Medicine*, 8(1), 21–29.

***