University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708 -9347, ISSN Print: 2708 -9339 Volume 15, Issue 1 (2026)

https://iasj.rdd.edu.iq/journals/journal/issue/20226 *https://doi.org/10.54174/utjagr.v13ii 41.*

Serological Study of Herpesvirus Infection of Local, Shirazi and Himalaya Breed in Baghdad City

Mustafa Jamal Majeed[1], Akil Farouq Saleh Alshawi[2]

[1]Internal and Preventive Veterinary Medicine – Canine and Feline Diseases, College of Veterinary Medicine, University of Baghdad, Baghdad, Iraq, ORCID: https://orcid.org/0009-0007-9093-3822

[2]Internal and Preventive Veterinary Medicine, College of Veterinary Medicine, University of Baghdad, Baghdad, Iraq, ORCID: https://orcid.org/0000-0003-0527-4273

I. Abstract

Background: Feline herpesvirus type 1 (FHV-1) is one of the most common viral pathogens affecting domestic cats worldwide, which a major cause of upper respiratory tract disease and ocular disorders. Infection often results in lifelong viral latency with periodic reactivation, leading to recurrent clinical manifestations and continuous viral spread among feline populations. Clinical signs commonly include conjunctivitis, corneal ulcers, nasal discharge, sneezing, fever, and respiratory distress. Despite the clinical importance of FHV-1, data regarding its seroprevalence and associated clinical findings in cats from Baghdad / Iraq, remain limited. Therefore, we have designed this study. **Methodology:** This research was conducted in Baghdad between November 2024 and April 2025, which involved 150 cats suspected of FHV-1 infection from different urban areas. Cats of three breeds (Local, Shirazi, and Himalayan) were included. Clinical examination was performed, and demographic data such as age, sex, breed, and location were recorded. Oropharyngeal and nasal swabs were collected, besides serum samples were analyzed for FHV-1 IgG antibodies using a chemiluminescent immunoassay (CLI) instrument. So, clinical parameters including rectal temperature, respiratory rate, and pulse rate were measured, and statistical analysis was conducted to assess associations. **Results:** Out of 150 cats, 20 (13.3%) were seropositive for FHV-1 antibodies. Seropositivity was observed across all breeds and age groups, with no significant association detected. Male cats showed significantly higher seropositivity than females. CLI-positive cats exhibited significantly higher rectal temperature and respiratory rate compared with seronegative cats, while pulse rate differences were not statistically significant.

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708 -9347, ISSN Print: 2708 -9339 Volume 15, Issue 1 (2026)

https://iasj.rdd.edu.iq/journals/journal/issue/20226 *https://doi.org/10.54174/utjagr.v13ii 41.*

II. Conclusion

Feline herpesvirus type 1 (FHV-1) is present among domestic cats in Baghdad with a seroprevalence of 13.3%, affecting different breeds and age groups. Male cats showed higher seropositivity, and infected cats exhibited significantly increased rectal temperature and respiratory rate. These findings highlight the clinical importance of FHV-1 and the need for improvement diagnostic screening and preventive strategies in region.

Keywords: Feline herpesvirus, Serology, Cats, Himalayan, Persian, Local breed

III. INTRODUCTION

Feline herpesvirus is considered a common and important pathogen in cats, as it causes severe oral infections and upper respiratory tract infections (URTD) (Asmaa *et al*., 2022), where symptoms involve a runny nose, sneezing, inflammation of the conjunctiva, as well as abortion (Becker *et al*., 2020) Infected cats have conjunctivitis, corneal ulcers, dyspnea, fever, depression, and other symptoms (Hartley *et al*., 2010). Furthermore, in severe cases, secondary bacterial infection and fibrin-necrotizing bronchopneumonia may lead to death in cats (Cohn *et al*., 2011). After FHV-1 infection in cats, the lesions mainly occur in the upper respiratory tract (Wong *et al*., 2013, Chan *et al*., 2023). Once infected with FHV-1, the host is a lifelong carrier of the virus, which seriously affects its health (Cavalheiro *et al*., 2023). Many cases of FHV-1 infection in cats have been reported worldwide (Di Martino *et al*., 2007; Spada *et al*., 2021), and FHV1 has also been detected and isolated in Beijing, Shanghai, and other places in China (Yang *et al*., 2024). The prevalence of feline herpesvirus in domestic cats has also been confirmed by recent research conducted in Iraq, underscoring the virus's role in respiratory and ophthalmic disorders in feline populations. FHV-1 antibodies were found in a significant number of cats investigated in a molecular and serological study carried out in Mosul. Clinical symptoms included conjunctivitis, nasal discharge, and mouth ulcers (Khudhur et al., 2025). These results highlight the virus's spread throughout Iraqi feline populations and the necessity of additional epidemiological surveillance in various parts of the nation (Khudhur et al., 2025). So, the study of animal diseases according to breeds is important to explore their variance of disease among it (Alshawi , 2019).

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708 -9347, ISSN Print: 2708 -9339 Volume 15, Issue 1 (2026)

https://iasj.rdd.edu.iq/journals/journal/issue/20226 *https://doi.org/10.54174/utjagr.v13ii 41.*

IV. MATERIALS AND METHODS

Animal study design

The study was carried out in Baghdad from November 2024 to April 2025, including 150 cats from urban areas such as Al-Adhamyia, Al-Kadhmia, Zaiuna, Al-Ghazalia, Hay Al-Jameaa, Haifa Street, and Palestine Street. Three breeds were studied: stray (Felis catus), Shirazi, and Himalayan. Each cat underwent clinical examination, and information on age, sex, breed, and clinical signs were recorded using a structured form with a consent of owner. Oropharyngeal and nasal swabs were collected , which transported by using viral transport medium to the specific diagnostic laboratory. Feline herpesvirus antibodies were detected using a Chemiluminescent Immunoassay instrument (CLI), which allows quantitative evaluation of IgG levels to assess immune status and support early disease detection. All samples were processed immediately to maintain antigen–antibody integrity.

Aim of study

Serological Study of Herpesvirus Infection of Feline Breeds in Baghdad City

Ethics Approval

This research is approved by the Ethic Committee in College of Veterinary Medicine / University of Baghdad under approval number 2663 date 20/10/2025.

Results:

The present study enrolled 150 cats suspected of being infected with Feline Herpesvirus type 1 (FHV -1). The population under study was well balanced in the three breeds namely Himalaya, Local, and Shirazi cats with a population of 50 each breed (33.3%). As to the age distribution, the most represented age groups were the 6-12 months age range (83 cats, 55.3%), then the age range of more than 12 months (48 cats, 32.0%), with the least proportion of 19 cats representing the age range of less than 6 months (12.7%). In terms of sex, there was a slight male preponderance of 80 cases (53.3 percent) and a female preponderance of 70 cases (46.7 percent), which gave a male to female ratio of about 1.14:1. With regard to geographic distribution, over half of the researched cats were in Al-Karkh district (87 cats, 58.0 percent) and the rest 63 cats (42.0 percent) were in Al-Rusafa district. The demographic traits of the analysed cats in the baseline are presented in (Table 1).

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708 -9347, ISSN Print: 2708 -9339 Volume 15, Issue 1 (2026)

https://iasj.rdd.edu.iq/journals/journal/issue/20226 *https://doi.org/10.54174/utjagr.v13ii 41.*

Table 1: Demographic characteristics of the studied cats.

Characteristics		No. (150)	Percentage (%)
Breed of cats	Himalaya	50	33.3
	Local	50	33.3
	Shirazi	50	33.3
Age group of cats	<6 months	19	12.7
	6-12 months	83	55.3
	>12 months	48	32.0
Sex of cats	Male	80	53.3
	Female	70	46.7
Location	Al-Karkh	87	58.0
	Al-Rusafa	63	42.0

Moreover, the equal representation of cat breeds in the present study minimizes breed-related sampling bias and allows for a more accurate assessment of FHV-1 distribution across different genetic backgrounds. Previous studies similarly reported no strong breed predisposition for FHV-1 infection, suggesting that environmental and management factors play a more dominant role than genetic susceptibility (Radford *et al*., 2009; Gaskell *et al*., 2014).

The predominance of cats aged 6–12 months agrees with multiple studies indicating that young cats are more susceptible to FHV-1 due to immature immune systems, increased exposure during socialization, and stress associated with weaning and environmental changes (Thiry *et al*., 2009; Walter *et al*., 2020). In contrast, some studies reported higher prevalence in adult cats, attributing this to viral latency and reactivation rather than primary infection (Gaskell and Povey, 1977) . The slightly higher proportion of male cats is consistent with findings by Pedersen *et al*. (2004), who suggested that male behavioural patterns such as roaming and fighting may increase exposure to infectious agents. However, other studies reported no sex-related difference in FHV-1 prevalence, indicating that sex alone is not a decisive risk factor (Helps *et al*., 2005).

The clinical parameters of the cats studied are presented in (Table 4-2). Furthermore, the mean rectal temperature of the examined cats was 38.35 ± 0.64 °C. The mean respiratory rate (RR) was 24.99 ± 2.11 cycles/min, while the mean pulse rate (PR) reached 179.43 ± 19.80 beats per minute. Overall, the recorded clinical parameters were within the expected physiological ranges for domestic cats.

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708 -9347, ISSN Print: 2708 -9339 Volume 15, Issue 1 (2026)

https://iasj.rdd.edu.iq/journals/journal/issue/20226 *https://doi.org/10.54174/utjagr.v13ii 41.*

Table 2: Clinical parameters of the studied cats.

Parameters	Mean± SD
Temperature °C	38.35± 0.64
Respiratory rate cycle /min	24.99±2.11
Pulse rate / BPM	179.43±19.80

Then, serological testing using the Chemuliscent Immunoassay (CLI) revealed that 20 cats (13.3%) tested positive for FHV-1 antibodies, whereas the majority of cats, 130 cases (86.7%), were seronegative. The distribution of FIA test results among the studied cats is illustrated in (Figure 4-1).

Distribution of Baseline Demographic Characteristics by CLI Results:

The distribution of baseline demographic characteristics of the studied cats regarding CLI results is presented in Table 4-3. Seropositivity for FHV-1 was observed across all breeds, with the highest proportion recorded in Local cats (22.0%), followed by Himalaya (12.0%) and Shirazi breeds (6.0%), although these differences were not statistically significant (P = 0.059). Regarding age groups, cats aged 6–12 months showed the highest IFA positivity (14.5%), followed by those younger than 6 months (15.8%) and cats older than 12 months (10.4%), with no significant association detected (P = 0.76). Later, a significant association was observed with sex, where male cats demonstrated a higher IFA positivity rate (18.8%) compared with females (7.1%), while female cats were more frequently IFA-negative (92.9%) (P = 0.037). Also, no significant differences were identified between geographic locations, although cats from the Al-Rusafa district showed slightly higher CLI positivity (15.9%) compared with those from Al-Karkh (11.5%) (P = 0.43).

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708 -9347, ISSN Print: 2708 -9339 Volume 15, Issue 1 (2026)

https://iasj.rdd.edu.iq/journals/journal/issue/20226 *https://doi.org/10.54174/utjagr.v13ii 41.*

Table 3: Distribution of baseline demographic characteristics of the studied cats regarding CLI results, no.150

Parameters		CLI results				P* value
		Positive		Negative		
		No.	%	No.	%	
Breed of cat	Himalaya	6	12.0	44	88.0	0.059
	Local	11	22.0	39	78.0	
	Shirazi	3	6.0	47	94.0	
Age group of cat	<6 months	3	15.8	16	84.2	0.76
	6-12 months	12	14.5	71	85.5	
	>12 months	5	10.4	43	89.6	
Sex of cat	Male	15	18.8	65	81.3	0.037
	Female	5	7.1	65	92.9	
Location	Al-Karkh	10	11.5	77	88.5	0.43
	Al-Rusafa	10	15.9	53	84.1	

Chi-Square Tests or Fisher's Exact Test, FIA =fluorescence immunoassay

The lack of any meaningful correlations between the outcomes of CLI and breed, age group, or geographic factors is consistent with the earlier findings that showed that FHV-1 exposure is well dispersed among feline populations irrespective of their genetic background or environment (Helps *et al*., 2005; Radford *et al*., 2009). Higher seropositivity in Local breed cats could be an indication of more access to the outdoors and exposure to the environment as opposed to actual breed susceptibility (Thiry *et al*., 2009). Equally, the positivity in the age group of 6-12 months is a bit higher, and this corresponds with the previous accounts that young cats are vulnerable to exposure during the socialization and stress stages (Walter *et al*., 2020). The considerable correlation between sex and CLI outcomes, where male cats are more seropositive than females, substantiate other researchers who note that male cats tend to practice behaviours including roaming, territorial, and increased contact rates contributing to the risk of getting exposed to the virus (Pedersen *et al*., 2004).

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708 -9347, ISSN Print: 2708 -9339 Volume 15, Issue 1 (2026)

https://iasj.rdd.edu.iq/journals/journal/issue/20226 *https://doi.org/10.54174/utjagr.v13ii 41.*

Clinical Parameters in Relation to CLI Results

The findings demonstrated that cats with positive CLI results exhibited significantly higher mean rectal temperature (38.83 ± 0.73 °C) compared with cats testing CLI-negative (38.28 ± 0.60 °C), with a highly significant difference (P < 0.001). Additionally, the mean respiratory rate was significantly increased among CLI-positive cats (26.00 ± 2.25 cycles/min) relative to CLI-negative cats (24.84 ± 2.05 cycles/min) (P = 0.02). Although the mean pulse rate was also higher in the CLI-positive group (186.45 ± 18.89 BPM) compared with the CLI-negative group (178.35 ± 19.79 BPM), this difference did not reach statistical significance (P = 0.08). (Table 4.6)

Table 4: Mean distribution of clinical parameters of the studied cats regarding CLI results, no.150

Parameters	CLI results		P* value
	Positive	Negative	
	Mean± SD	Mean± SD	
Temperature °C	38.83±0.73	38.28±0.60	<0.001
RR cycle /min	26.00±2.25	24.84±2.05	0.02
PR BPM	186.45±18.89	178.35±19.79	0.08

Independent Samples Test, RR=Respiratory rate, PR =Pulse rate, FIA =fluorescence immunoassay

These findings are consistent with earlier studies that reported subtle physiological alterations in seropositive cats due to recent exposure, incomplete viral clearance, or intermittent viral reactivation typical of herpesvirus infections (Thiry *et al*., 2009; Maggs *et al*., 2010). So, the slight increase in temperature observed among CLI-positive cats may indicate transient fever associated with immune activation, a phenomenon previously described in cats with recent FHV-1 exposure (Helps *et al*., 2005).

However, the clinical values in both groups remained largely within normal reference ranges, supporting the well-established understanding that FHV-1 infections do not always cause pronounced systemic abnormalities (Fernandez *et al*., 2016). Many seropositive cats may be in latent stages or experiencing mild reinfection, during which clinical signs can be minimal or absent (Walter *et al*., 2020). The insignificant elevation of pulse rate in FIA-positive cats is also in agreement with studies indicating that cardiovascular parameters are rarely significantly altered during non-acute FHV-1 infections unless complicated by bacterial co-infections or severe upper respiratory tract involvement (Sykes, 2014).

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708 -9347, ISSN Print: 2708 -9339 Volume 15, Issue 1 (2026)

https://iasj.rdd.edu.iq/journals/journal/issue/20226 *https://doi.org/10.54174/utjagr.v13ii 41.*

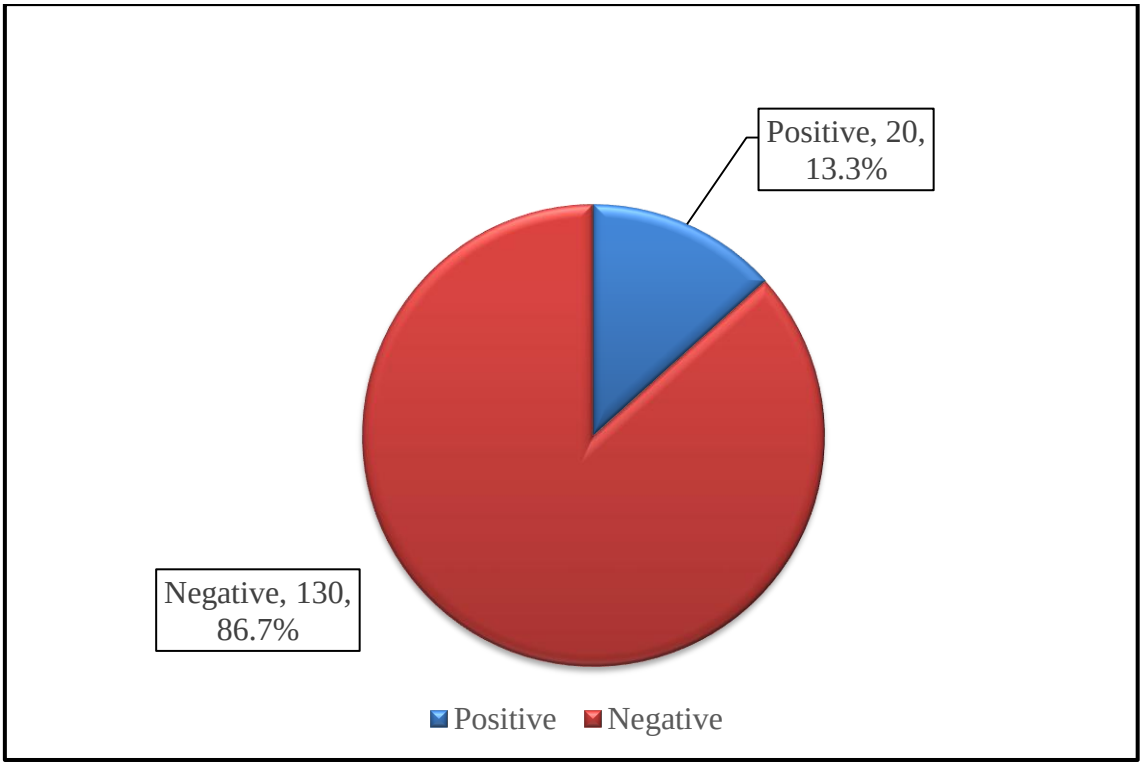

Figure 1: Serological test results (Chemiluminescent Immunoassay instrument, CLI) among the studied cats.

V. Conclusion

The present study demonstrates that feline herpesvirus type 1 (FHV-1) is circulating among cats in Baghdad, with a seroprevalence of 13.3% detected using chemiluminescent immunoassay. Infection was observed across all breeds and age groups, indicating widespread exposure within the feline population. Male cats showed a significantly higher seropositivity rate, suggesting behavioural factors may contribute to viral transmission. Although CLI-positive cats exhibited mild but significant increases in rectal temperature and respiratory rate, most clinical parameters remained within normal ranges. These findings highlight the importance of continuous surveillance, early serological screening, and improved management strategies to control FHV-1 infection in cats in Baghdad.

ISSN Onlin:2708 -9347, ISSN Print: 2708 -9339 Volume 15, Issue 1 (2026)

https://iasj.rdd.edu.iq/journals/journal/issue/20226 *https://doi.org/10.54174/utjagr.v13ii 41.*

Acknowledgments

The authors gratefully acknowledge the College of Veterinary Medicine, University of Baghdad, for providing laboratory facilities and technical support. Appreciation is extended to the Diagnostic Laboratory staff for their assistance, and to cat owners for their cooperation, which greatly contributed to the successful completion of this study.

Authors' Contributions

ZSA: sample collection, laboratory work, data analysis, manuscript drafting. MFH: supervision, study design, data interpretation, manuscript revision

Conflicts of Interest

The author(s) declares no conflicts of interest

VI. REFERENCES

Alshawi, A. (2019). Genomic characterisation of Iraqi indigenous taurine x zebu crossbred cattle. Ph.D. thesis, Vet.Med. School, The University of Nottingham, United Kingdom.

Asmaa, M., Lokman, M. S., Ashraf, A., & Ehab, K. L. (2022). First report of isolation and molecular characterization of felid herpesvirus-1 from symptomatic domestic cats in Egypt. *Veterinary World*, 15(2), 1–7.

Becker, A. S., Monteiro, F. L., Scariot, A. C. A., Chagas, D. B., Fischer, G., Lima, M. D., & Hübner, S. O. (2020). High occurrence of felid alphaherpesvirus-1 and feline calicivirus in domestic cats from southern Brazil. *Pesquisa Veterinária Brasileira*, 40, 685–689. https://doi.org/10.1590/1678-5150-pvb-6756

Cavalheiro, J. B., Echeverria, J. T., Ramos, C. A. N., & Babo-Terra, V. J. (2023). Frequency of feline herpesvirus-1 (FHV-1) in domestic cats from Campo Grande, MS, Brazil. *Anais da Academia Brasileira de Ciências*, 95, e20221010. https://doi.org/10.1590/0001-3765202320221010

Chan, I., Dowsey, A., Lait, P., Tasker, S., Blackwell, E., Helps, C. R., & Barker, E. N. (2023). Prevalence and risk factors for common respiratory pathogens within a cohort of pet cats in the UK. *Journal of Small Animal Practice*, 64(9), 552–560. https://doi.org/10.1111/jsap.13600

Cohn, L. A. (2011). Feline respiratory disease complex. *Veterinary Clinics of North America: Small Animal Practice*, 41(6), 1273–1289. https://doi.org/10.1016/j.cvsm.2011.08.003

Di Martino, B., Di Francesco, C. E., Meridiani, I., & Marsilio, F. (2007). Etiological investigation of multiple respiratory infections in cats. *New Microbiologica*, 30(4), 455–461.

Fernandez, M., Manzanilla, E. G., Lloret, A., León, M., & Thibault, J. (2016). Prevalence of feline herpesvirus-1, feline calicivirus, *Chlamydophila felis* and *Mycoplasma felis* DNA and associated risk factors in cats in Spain with upper respiratory tract disease, conjunctivitis and/or gingivostomatitis. *Journal of Feline Medicine and Surgery, 19*(4), 461–469. https://doi.org/10.1177/1098612x16634387

ISSN Onlin:2708 -9347, ISSN Print: 2708 -9339 Volume 15, Issue 1 (2026)

https://iasj.rdd.edu.iq/journals/journal/issue/20226 *https://doi.org/10.54174/utjagr.v13ii 41.*

Gaskell, R. M., & Povey, R. C. (1977). Experimental induction of feline viral rhinotracheitis virus re-excretion in cats by corticosteroids. *Veterinary Record, 100*(7), 128–133. https://doi.org/10.1136/vr.100.7.128

Gaskell, R. M., Radford, A. D., Dawson, S., & Thiry, E. (2014). Feline herpesvirus infection. In C. E. Greene (Ed.), *Infectious diseases of the dog and cat* (4th ed., pp. 134–141). Elsevier.

Hartley, C. (2010). Aetiology of corneal ulcers: Assume feline herpesvirus-1 unless proven otherwise. *Journal of Feline Medicine and Surgery*, 12(1), 24–35. https://doi.org/10.1016/j.jfms.2009.10.006

Helps, C., Lait, P., Damhuis, A., Björnehammar, U., Bolta, D., Brovida, C., et al. (2005). Factors associated with upper respiratory tract disease caused by feline herpesvirus and feline calicivirus in cats from animal shelters. *Veterinary Record, 156*(11), 346–350. https://doi.org/10.1136/vr.156.11.346

Maggs, D. J., Clarke, H. E., & Nasisse, M. P. (2010). Feline herpesvirus-1 infection. *Compendium on Continuing Education for the Practicing Veterinarian, 32*, E1–E11.

Pedersen, N. C., Sato, R., Foley, J. E., & Poland, A. M. (2004). Common virus infections in cats before and after being placed in shelters. *Journal of Feline Medicine and Surgery, 6*(2), 83–88. https://doi.org/10.1016/j.jfms.2003.08.008

Radford, A. D., Addie, D., Belák, S., Boucraut-Baralon, C., Egberink, H., Frymus, T., et al. (2009). Feline herpesvirus infection: ABCD guidelines on prevention and management. *Journal of Feline Medicine and Surgery, 11*(7), 547–555. https://doi.org/10.1016/j.jfms.2009.05.007

Spada, E., Vitale, F., Bruno, F., Castelli, G., Reale, S., Perego, R., Baggiani, L., & Proverbio, D. (2021). A pre- and during-pandemic survey of SARS-CoV-2 infection in stray colony and shelter cats from a high endemic area of Northern Italy. *Viruses*, 13(4), 618. https://doi.org/10.3390/v13040618

Sykes, J. E. (2014). Feline upper respiratory tract infections. *Veterinary Clinics of North America: Small Animal Practice, 44*(2), 331–342. https://doi.org/10.1016/j.cvsm.2013.11.006

Thiry, E., Addie, D., Belák, S., Boucraut-Baralon, C., Egberink, H., Frymus, T., et al. (2009). Feline herpesvirus infection. *Journal of Feline Medicine and Surgery, 11*(7), 547–555. https://doi.org/10.1016/j.jfms.2009.05.007

Walter, J., Foley, P., Yason, C., Vanderstichel, R., & Muckle, A. (2020). Prevalence of feline herpesvirus-1, feline calicivirus, *Chlamydia felis*, and *Bordetella bronchiseptica* in shelter cats. *Veterinary Microbiology, 246*, 108734. https://doi.org/10.1016/j.vetmic.2020.108734

Wong, W. T., Kelman, M., & Ward, M. P. (2013). Surveillance of upper respiratory tract disease in owned cats in Australia, 2009–2012. *Preventive Veterinary Medicine*, 112(1–2), 150–155. https://doi.org/10.1016/j.prevetmed.2013.07.002

Yang, D., Ju, H., Li, X., Shen, H., Ge, F., Yang, X., Zhao, H., Wu, X., Zhu, X., Wang, X., et al. (2024). Epidemiological surveillance of respiratory diseases in urban stray cats in Shanghai. *Animals*, 14(11), 1562. https://doi.org/10.3390/ani14111562