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Integrating dog shelters in the One Health perspective: is this truly achievable?

Luigi Sacchettino[1§], Claudia Gatta[1§], Alessandra Pelagalli[2,3], Lucianna Maruccio[1], Francesco Napolitano[1,4*], Luigi Avallone[1] and Danila d'Angelo[*1]

[1] *Department of Veterinary Medicine and Animal Production, University of Naples Federico II 80137-Naples, Italy; luigi.sacchettino@unina.it (L.S.); lucianna.maruccio@unina.it (L.M.); gattaclaudia@gmail.com (C.G.); Francesco.napolitano3@unina.it (F.N.); avallone@unina.it (L.A.); danila.dangelo@unina.it (D.d'A.)*

[2] *Department of Advanced Biomedical Sciences, University of Naples Federico II; alpelaga@unina.it (A.P.)*

[3] *Institute of Biostructures and Bioimages (IBB), National Research Council (CNR), 80131 Naples, Italy: alpelaga@unina.it (A.P)*

[4] *CEINGE-Biotecnologie Avanzate Franco Salvatore 80145 Naples, Italy; napolitano@ceinge.unina.it (F.N.)*

[§] *These authors have equally contributed to this work and share the first authorship*

Abstract: In Italy, kennel management in the One health framework is often difficult to realize, mainly because of a general overcrowding effect for housed dogs, associated to the lower adoption rate, which all have a significant impact upon operating costs. In the present commentary we discussed about the importance of employing integrated and innovative strategies to improve the quality of life of sheltered dogs, thus allowing them to be adopted more easily. In this respect, together with an accurate behavioral rehabilitation program, taking timely actions to prevent the most common diseases affecting animal health in the kennel, is an unmet need. Collectively, based on our previous findings, we suggest that a good handling of companion dogs in the kennels might be challenging to ensure animal welfare and improve human-dog relationship.

Key Words: Shelter; dog welfare; veterinary behaviorist; dog training; human-dog relationship; dog adoption; One Health.

* *Corresponding Author*: danila.dangelo@unina.it; (F.N.): francesco.napolitano3@unina.it

Introduction

There has long been a growing scientific interest worldwide about the human-dog relationship, to improve the standard of living for companion animals. Starting from the middle of the 20th century, dogs are more frequently regarded as "real members" of the households. Accordingly, they generally play a key role for the physical and mental health of the owners, as revealed by the improvement of their physiological parameters, including blood pressure, neuroendocrine responses, and blood metabolite concentrations, mainly under stressful conditions, and their welfare as well (d'Angelo et al., 2021; Odendaal, 2000). On the other hand, ensuring appropriate health conditions in dogs is a compelling need, to avoid pathogens transmission to humans, often associated to city urbanization and spread of zoonotic diseases, such as leptospirosis, methicillin-resistant Staphylococcus aureus (MRSA) or rabies virus (Steneroden et al., 2011). In this context, kennels should adopt specific flow control programs for sheltered dogs, allowing them to quickly recover from physical and behavioral issues, and foster the number of adoptions. Shelters are nowadays regarded as a sort of dump somehow, where animals are kept isolated, with no chances of increasing their wellbeing, or satisfying the intraspecific physiological requirements (Beerda et al., 1999; d'Angelo et al., 2022; d'Ingeo et al., 2021; Patronek et al., 1996). Indeed, several factors, like spatial and social restriction, as well as exposure to novel environments in long-lasting stay,

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that may all contribute to a decreased welfare within the shelter, were previously described by our research group (Fazio et al., 2019). Therefore, looking after companion animals in Italian shelters still remains an unsettled and not yet regulated topic, which is typically regulated by the ethical choices of the kennel managers, staff or voluntary associations (d'Ingeo et al., 2022). Of note, in our recent work we highlighted the importance to carry out an accurate training program by qualified dog trainers and vet behaviorists, to build up a better dog-human relationship, thus promoting a constant flow of adoptions (d'Angelo et al., 2021; d'Angelo et al., 2022). However, the role of companion animals, seems to be slightly underestimated (Overgaauw et al., 2020), thus calling for the adoption of functional actions in the next future, able to improve human welfare and health. Thus, based on a novel "kennel conception", developed in 2004 by Reeve and colleagues, who described a functional triad, about the connection between human wellbeing, animal welfare and organizational health (Reeve et al., 2004), in the present commentary we sought to emphasize how such innovative strategies might be implemented in kennels and figured out in the One Health perspective.

1. Italian law about shelters management

Shelters are generally one of the main concerns for the human-dog relationship, a place where dogs go into exile, becoming a burden on society, although in Italy laws about animal welfare are still in place. Among several rules about dog protection in compliance with the Italian legal system, the law no 189/04 includes crimes against the feeling of animals in the penal code and provides for severe punishment for any kind of killing, caused by cruelty or with no need. Likewise, euthanasia is not allowed in Italy, since the law no 281 of 14 August 1991 requires that stray dogs found, caught, or admitted to kennels cannot be suppressed or intended to allow experimentation, unless they are seriously ill, untreatable, or in cases where damage to the environment or to humans is proven. Of note, in any case stray dogs or cats, who live in feline colonies, may be moved to countries whose legislation on the mistreatment of pets and their use for scientific purpose does not comply with the Italian regulation. Despite this, shelters commonly have few economic resources and small trained staff available to recover kenneled dogs from their behavioral dysfunctions, not allowing them to establish a suitable relationship with humans (Protopopova et al., 2012). Indeed, d'Ingeo et al. (2022) documented the complexity of volunteering with sheltered dogs at least in Italy, insofar people who express deep affection towards both sheltered or stray animals, are often not able to set up proper training programs, thus causing a growing number of dysfunctional interventions, such as non-socialized catching or superficial/not suitable adoptions (d'Ingeo et al., 2022). As a consequence, social, physiological, and ethological needs are not always met, mainly due to the lack of refinement strategy protocols and specific oversight, and the animals are hardly prone to leave the shelter and be easily adopted (Beerda et al., 1999; d'Ingeo et al., 2021; Patronek et al., 1996). Therefore, a greater sensitivity from the public institutions or stakeholders in general, aimed at considering the importance of house conditions and welfare of sheltered dogs, within the One Health framework, should be advised. Worth mentioning is the notion that, in compliance with Campania Region rules about shelters management, public or private buildings can be equipped with skilled veterinary behaviorists, who are involved in the rehabilitation program of dogs affected by behavioral dysfunctions (Campania RCo, 2019).

2. Dysfunctional human-dog bond

Animals are involved in every aspect of daily life for benefit of people, ranging from farming and servicing to research and companionship. However, human-animal relationship has signifi-

cantly evolved over the past centuries, since they are enrolled in working activities (house protection and/or catching mice), social functions, and companionship as well (Overgaauw et al., 2020). On the other hand, given their ability to perceive positive and negative emotions, animals can even benefit from humans, thus highlighting the importance of developing practical welfare assessment indicators, either for husbandry or companion animals (Wemelsfelder & Mullan, 2014). To this aim, multiple dysfunctional issues that can make dogs subjected to anthropomorphism, and eventually jailed in kennels, are worth taking into account (d'Angelo et al., 2020; d'Angelo et al., 2022; Mota-Rojas et al., 2021; Riggio & Nonni, 2020). In the past, an extensive body of literature, focused on detrimental effects of housing dogs in shelters over an extra time, documenting their attitude to develop further behavioral issues (Mohan-Gibbons et al., 2012), or experience higher stress levels (Coppola et al., 2006) and socio-cognitive declines (Udell et al., 2010). Moreover, once in the shelter dogs normally run into new sounds and scent, that allowed them to be more aggressive than housed ones (Coppola et al., 2006), and may develop immune system disorders (Fazio et al., 2019; Protopopova, 2016). In Italy, such severe alterations experienced by sheltered dogs can undoubtedly affect their ability to be adopted by the future owners, who generally consider dogs as companion animals, and typically strive towards underestimate their clinical issues (Diverio et al., 2016). However, the great availability of shelters in the last twenty years has led to an increase of qualified staff units working on behalf of homeless companion animals, undoubtedly saving many animal lives, and improving dog's welfare (Campania RCo, 2019). Thus, positive interactions occurring in the shelters can reduce stress-related behaviors in housed dogs, as well as modify heart rate variability (Bergamasco et al., 2010; Coppolaet al., 2006; Fazio et al., 2019; Shiverdecker et al., 2013). Therefore, one of the functional goals for a proper kennel management should rely not only on the control of zoonotic diseases and straying, but also on cognitive and social skills of the housed dogs, to optimize their welfare and facilitate the adoption process.

3. Human-dog relationship in the shelter: the importance of a focused training program

Growing knowledge about animal welfare takes into account the notion of behavior, neuroscience, physiology and sentience of dogs (Balcombe, 2009; Boissy et al., 2007; Cobb et al., 2021), and welfare can be scientifically assessed through five organized domains envisioned in the One Welfare approach, namely nutrition, environment, health, behavioral interactions and mental state (Mellor et al., 2020). In this respect, we can hypothesize a robust and dynamic association between welfare and psychophysical health of both people and animals (Lem, 2019; Mor et al., 2018; Pinillos et al., 2016). Training activity within the kennels has definitely a positive impact upon dog behavior, which cause them to be more balanced, adaptable, sociable, easy to manage and to be adopted (Kubinyi et al., 2009; Menchetti et al., 2015; Patronek et al., 1996; Riggio, 2018). The existence of highly specialized training staff, that looks after kenneled dogs, should be warranted.

Accordingly, in our recent work we stressed the importance of an interdisciplinary approach, that we documented for the kennel in Ottaviano (Naples), which basically relies on both veterinary behaviorist and dog instructor (d'Angelo et al., 2022), and sheds lights on the implementation of a tailored training program as a rule, in order to improve either physiological attitudes or pathological conditions of the companion dogs, and ensure a better and long-lasting human-animal bond (d'Angelo et al., 2021; d'Angelo et al., 2022). Moreover, tutoring the adoptive family about the behavioral therapy to adopt upon the dogs, to stabilize and balance the functional recovery of dogs, should be accomplished by experienced staff. In this line, Powell and colleagues found that two-thirds of owners experienced dog behavioral problems following adoption, even though some of them reduced over time (e.g., difficulties with training and fear). In addition, owners who returned their dog to the shelter by three months from the adoption had higher ex-

pectations of their dog and human–dog relationship (Powell et al., 2022). Integrating skilled staff in kennels would facilitate a conscious adoption, thus reducing the risk of prejudice and expectations by future adopters (d'Angelo et al., 2022). All of these strategies share the common features of the One Health approach, which means of "care ability" (Fawcett et al., 2019). Accordingly, the shelter dog in Ottaviano is equipped with a diffusion system of classical music, playing every day from 2 to 7 p.m., thereby increasing resting behavior and decreasing distress as well (d'Angelo et al., 2022).

4. Environment-kennel connection

To make shelters perfectly integrated in the One Health conception, the ecological footprint they have, in terms of organic waste pollution, as well as energy consumption, must be faced by means of breakthrough systems. In this respect, as previously described, the management practices of the kennel in Ottaviano (Naples) set the stage for a good welfare in canine health (d'Angelo et al., 2022). The building is equipped with a photovoltaic system of 50 KW, on the roof of the boxes, that covers 80% of the needs (Figure 1a). This energy is used for heat lamps in indoor areas of the box. The kennel employs chemical-physical purification areas and phytovaporation of wastewater, thus reducing environmental pollution (Figure 1b). The enclosure is equipped with a nebulization system to abate bad smells and make environmental disinfection, as well as to introduce water in the boxes, during the warmest time of the hot seasons, either for dog refreshment or reinstatement of the thermoneutral zone (Figure 1c). Each box has a sleeping area, as well as covered and uncovered outdoor space. Of note, the sleeping area is characterized by the heated floor system (Figure 1d).

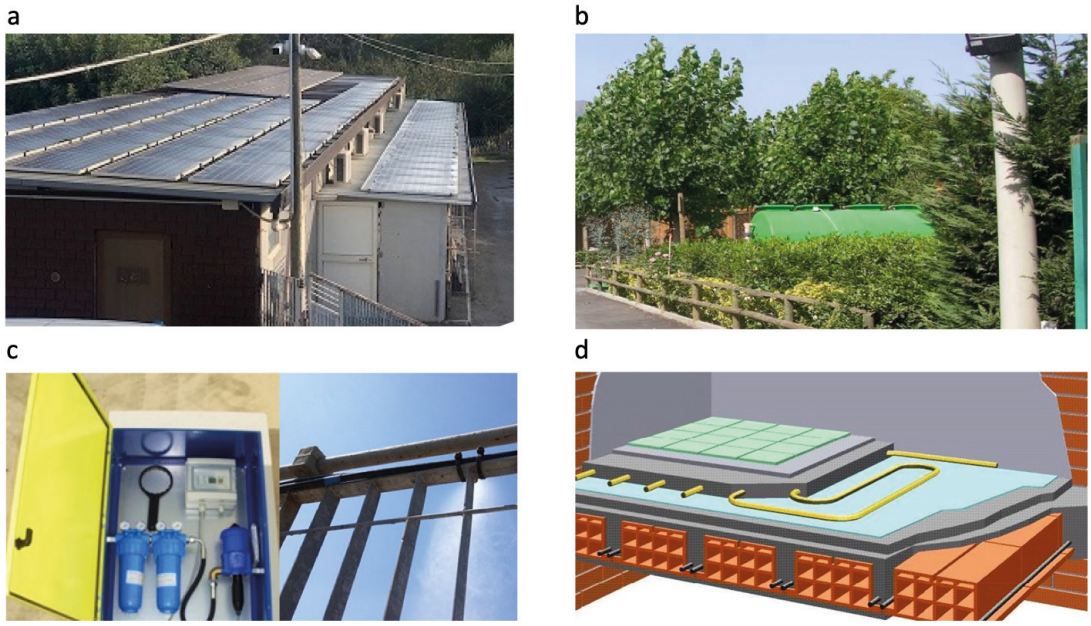

Figure 1. Main features of the shelter dog. (a) Solar panels above the dog boxes; (b) Phytoevaporation area; (c) Nebulization system; (d) Representative picture of heated floor system in each dog boxes.

The disposal system for box cleaning is carried out through eight well characterized steps. All boxes are structured with sewage collection channels, that gather in a main pipeline (Phase 0). At this stage, sewage ends up in a sweeper (Phase 1), which can segregate any solids, hairs and liquid, and turns into the Imhoff tanks (Phase 2). Then, by means of a special pump, liquids are conveyed in a further very thin mesh cleaner, with a subsequent entry into the purifier (Phase 3). Soon after the purification process (Phase 4) with activated sludge, the purified liquid is introduced into the overflow-mediated phytoevaporation system (Phase 5). There is a routine check of the sludge (using special forms), to verify its status, and possible excess that must be removed in the appropriate tank (Phase 6), to allow sedimentation and following entry into the filter press (Phase 7). The sludge produced by the filter press (the reduction of which is about 80%), is being thrown away by a specialized company with waste CER code 19.08.13. Overall, this system allows the "zero" liquid discharge coming from the cleaning of the boxes. Noteworthy, the kennel under examination got the Nomination for the EUROPEAN EMAS AWARD in 2010, which is the highest European recognition for company management.

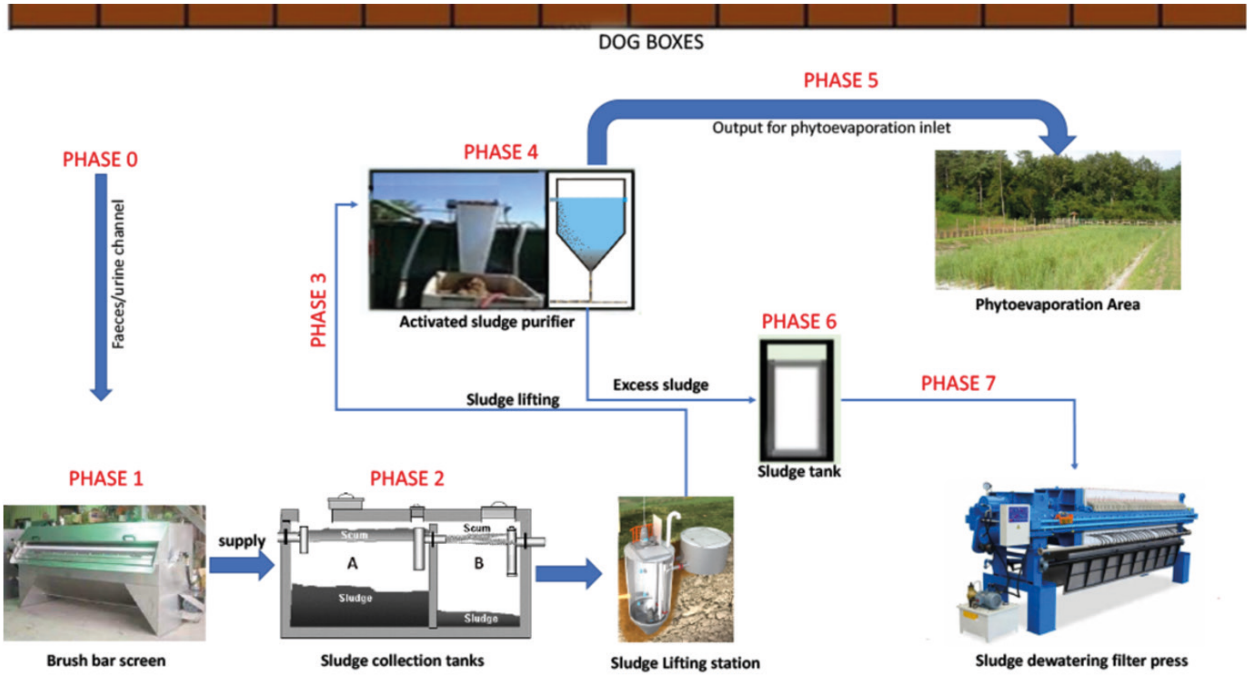

Figure 2. Depiction of the waste disposal phases of the shelter dog in Ottaviano, which uses phytovaporation process of wastewater, thus reducing environmental pollution of the area. PHASE 0: Collector channel for dog faeces and urine; PHASE 1: Brush sludge collector; PHASE 2: Sludge tanks (Imhoff); PHASE 3: Fine-mesh sludge purifier; PHASE 4: Purification process; PHASE 5: Phytoevaporation; PHASE 6: Excess sludge tank; PHASE 7: Dewatering filter press entry.

Box cleaning water turns eventually into wastewater, having the potential to be contaminated with dog by-products, such as faeces and urine. The contagiousness degree for this waste material surely depends on animals' health and/or prior treatments (e.g., worming cure), performed by the shelter operators. However, the spreading effect of the diseases will be determined by the hygiene standards of the facility, too. Dogs are regarded as a "major reservoir for zoonotic infections", insofar they can transmit most of the viral and bacterial infections to humans through bites, along with protozoa by the oral-fecal route (Ghasemzadeh & Namazi, 2015). Therefore, kennels represent a high-risk habitat, where disease is more likely to occur, spread out more easily, because of environmental stressors, mainly caused by the restricted inter-boxes space (Dendoncker et al., 2018). In this respect, the kennel uses chlorine-based sanitizers, in compliance with the EMAS certification, thus suggesting that a thorough cleaning schedule should be the highest priority for all the buildings. In addition, wastewater may also have an environmental hazard due to the relatively high levels of dogs' faeces-derived nitrogen, thus suggesting a careful attention to the nutrient levels in the natural environment to avoid eutrophication (Chislock et al., 2013; Nemiroff & Patterson, 2007). To minimize discharge the kennel in Ottaviano has adopted an evapo-transpiration system, made up of a specific plants. Finally, dog boxes have a floor of waterproof concrete, and during the box washing all the leached material goes to the appropriate collector, thus avoiding any kind of animal waste-derived soil and subsoil pollution.

5. Conclusion

Dog shelters are certainly stressful for both housed dogs and people, who are in contact with them. Thereby, employment of an integrated One Health approach, covering appropriate life conditions and tailored rehabilitation program as well, allow us to better understand and address welfare concerns in sheltered dogs. Future research studies, aimed at promoting and strengthening this interdisciplinary strategy in a One Health perspective, are mandatory. Finally, the arising outcomes will allow us to evaluate the harm-benefit ratio and, in turn, draw refined or changed strategies considering the evidence. Collectively, the present commentary would be a proof of principle about how shelters can protect sentient beings in the One Health perspective, although it is not always fulfilled, because of both legislative vacuum and recurrent state of financial shortage. Of interest, we believe that one of the benefits that may arise from such a "novel" kennel conception might rely on the creation of a circular microeconomy, where the investment in environmental technologies, including the photovoltaic system, might provide cost saving to be used for the improvement of the housed dog conditions. In addition, shelter management should provide training lessons for a fee, by qualified dog trainers, ensuring the support of technical staff, aimed at facilitating the adoption process. Financial management of the shelter is complex, that's why it should be framed in an entrepreneurial vision, overcoming the pietistic and anthropocentric approach and focusing on the interconnections between environment, humans, and animals.

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References

Balcombe J. Animal pleasure and its moral significance. Appl. Anim. Behav. Sci. 118: 208-216; 2009.

Beerda B., Schilder M.B., Bernadina W., van Hooff J.A., de Vries H.W., Mol J.A. Chronic stress in dogs subjected to social and spatial restriction. II. Hormonal and immunological responses. Physiol. Behav. 66: 243-254; 1999.

Bergamasco L., Osella M.C., Savarino P., Larosa G., Ozella L., Manassero M., Badino P., Odore R. Heart rate variability and saliva cortisol assessment in shelter dog: Human–animal interaction effects. Appl. Anim. Behav. Sci. 125:.56-68; 2010.

Boissy A., Manteuffel G., Jensen M.B., Moe R.O., Spruijt B., Keeling L.J., Winckler C., Forkman B. Assessment of positive emotions in animals to improve their welfare. Physiol. Behav. 92: 375-397; 2007.

Campania RCo (2019), http://www.regione.campania.it/assets/documents/leggeregionale3-2019-alla-31-2021.pdf. Regional Campania Bullettin.

Chislock M.F., Doster E., Zitomer R.A., Wilson A.E. Eutrophication: Causes, consequences, and controls in aquatic ecosystems. Nature Edu Knowledge. (2013).

Cobb M.L., Otto C.M., Fine A.H. The Animal Welfare Science of Working Dogs: Current Perspectives on Recent Advances and Future Directions. Front. Vet. Sci. 8:666898; 2021.

Coppola C.L., Grandin T., Enns R.M. Human interaction and cortisol: can human contact reduce stress for shelter dogs? Physiol. Behav. 87: 537-541; 2006.

d'Angelo D., Chirico A., Sacchettino L., Manunta F., Martucci M., Cestaro A., Avallone L., Giordano A. Human-Dog relationship during the first COVID-19 lockdown in Italy. Animals *11* 2335; 2021. https://doi.org/10.3390/ani11082335.

d'Angelo D., Ciani F., Zaccherini A., Tafuri S., Avallone L., d'Ingeo S., Quaranta A. human-animal relationship dysfunction: a case study of animal hoarding in Italy. Animals *10:* 1501; 2020. https://doi.org/10.3390/ani10091501.

d'Angelo D., d'Ingeo S., Ciani F., Visone M., Sacchettino L., Avallone L., Quaranta A. Cortisol levels of shelter dogs in animal assisted interventions in a prison: an exploratory study. Animals 11: 345; 2021. https://doi.org/10.3390/ani11020345 Animals (Basel) 11.

d'Angelo D., Sacchettino L., Carpentieri R., Avallone L., Gatta C., Napolitano F. An interdisciplinary approach for compulsive behavior in dogs: a case report. Front. Vet. Sci. 9:801636; 2022. doi: 10.3389/fvets.2022.801636

d'Angelo D., Sacchettino L., Quaranta A., Visone M., Avallone L., Gatta C., Napolitano F. The Potential Impact of a Dog Training Program on the Animal Adoptions in an Italian Shelter. Animals 12:1-9.

d'Ingeo S., Ferlisi G., Minunno M., Palmisano G.L., Ventriglia G., Siniscalchi M., Quaranta A. Motivations of human helping behavior towards dogs. Vet. Sci. 9; 2022. DOI: 10.3390/vetsci9030145

d'Ingeo S., Iarussi F., De Monte V., Siniscalchi M., Minunno M., Quaranta A. Emotions and dog bites: could predatory attacks be triggered by emotional states? Animals 11: 2907; 2021, https://doi.org/10.3390/ani11102907.

Dendoncker P.A., Moons C., Sarrazin S., Diederich C., Thiry E., de Keuster T., Dewulf J. Biosecurity and management practices in different dog breeding systems have considerable margin for improvements. Vet. Rec. 183:381; 2018.

Diverio S., Boccini B., Menchetti L., Bennett P.C. The Italian perception of the ideal companion dog. Journal of Veterinary Behavior 12: 27-35; 2016.

Fawcett A , Hazel S , Collins T , Degeling C , Fisher A , Freire R , Hood J , Johnson J. Australian and New Zealand veterinary students' opinions on animal welfare and ethical issues concerning animal use within sport, recreation, and display. J.Vet. Med. Educ. 46: 264-272; 2019.

Fazio E., Cravana C., Giuliano A., Medica P. Physiological responses of dogs to different housing systems. Acta Scientiae Veterinariae 47: 1-7; 2019.

Ghasemzadeh I., Namazi S.H. Review of bacterial and viral zoonotic infections transmitted by dogs. J. Med. Life 8:.1-5; 2015.

Kubinyi E., Turcsan B., Miklosi A. Dog and owner demographic characteristics and dog personality trait associations. Behav. Processes 81: 392-40; 2009.

Lem M. Serving homeless populations through a One Health approach. Can. Vet. J. 60:.1119-1120; 2019.

Mellor D.J., Beausoleil N.J., Littlewood K.E., McLean A.N., McGreevy P.D., Jones B., Wilkins C. The 2020 five domains model: including human-animal interactions in assessments of animal welfare. Animals.10; 2020.

Menchetti L., Mancini S., Catalani M.C., Boccini B., Diverio S. RandAgiamo, a pilot project increasing adoptability of shelter dogs in the Umbria Region (Italy). Animals. 5:.774-792; 2015.

Mohan-Gibbons H., Weiss E., Slater M. Preliminary Investigation of Food Guarding Behavior in Shelter Dogs in the United States. Animals. 2: 331-346; 2012.

Mor S.M., Norris J.M., Bosward K.L., Toribio J., Ward M.P., Gongora J., Vost M., Higgins P.C. One health in our backyard: Design and evaluation of an experiential learning experience for veterinary medical students. One Health. 5: 57-64; 2018.

Mota-Rojas D., Mariti C., Zdeinert A., Riggio G., Mora-Medina P., Del Mar Reyes A., Gazzano A., Dominguez-Oliva A., Lezama-García K., José-Pérez N., Hernández-Ávalos I. Anthropomorphism and Its Adverse Effects on the Distress and Welfare of Companion Animals. Animals. 11; 2021. doi.org/10.3390/ani11113263

Nemiroff L., Patterson J. Design, testing and implementation of a large-scale urban dog waste composting program. Compost Science & Utilization. 15: 237-242; 2007.

Odendaal J.S. Animal-assisted therapy - magic or medicine? J. Psychosom. Res. 49: 275-280; 2000.

Overgaauw P.A.M., Vinke C.M., Hagen M., Lipman L.J.A. A One health perspective on the human-companion animal relationship with emphasis on zoonotic aspects. Int. J. Environ. Res. Public Health 17; 2020.

Patronek G.J., Glickman L.T., Beck A.M., McCabe G.P., Ecker C., Risk factors for relinquishment of dogs to an animal shelter. J. Am. Ve.t Med. Assoc. 209: 572-581; 1996.

Pinillos R.G., Appleby M.C., Manteca X., Scott-Park F., Smith C., Velarde A. One Welfare - a platform for improving human and animal welfare. Vet. Rec. 179: 412-413; 2016.

Powell L., Walsh M., Reinhard C.L., Satriale D., Serpell J., Watson B. Returning a shelter dog: the role of owner expectations and dog behavior. Animals. 12: 1053; 2022. https://doi.org/10.3390/ani12091053 Protopopova A. Effects of sheltering on physiology, immune function, behavior, and the welfare of dogs. Physiol. Behav. 159: 95-103; 2016.

Protopopova A., Gilmourb A.J., Weiss R.H., Shena J.Y., Wynnea C.D.L. The effects of social training and other factors on adoption success of shelter dogs. Appl. Anim. Behav. Sci. 142: 61-68; 2012.

Reeve C.L., Spitzmuller C., Rogelberg S.G., Walker A., Schultz L., Clark O. Employee reactions and adjustment to euthanasia-related work: identifying turning-point events through retrospective narratives. J Appl. Anim. Welf. Sci. 7: 1-25; 2004.

Riggio G. A review on the effects of sensory stimulation in shelter dogs. Dog Behavior. 4; 2018.

Riggio G., Nonni V. Pain or anxiety: the case of a 12-year-old German Shepherd. Dog Behavior 1: 31-37; 2020.

Shiverdecker M.D., Schiml P.A., Hennessy M.B. Human interaction moderates plasma cortisol and behavioral responses of dogs to shelter housing. Physiol. Behav. 109:.75-79; 2013.

Steneroden K.K., Hill A..E, Salman M.D. Zoonotic disease awareness in animal shelter workers and volunteers and the effect of training. Zoonoses Public Health. 58: 449-453; 2011.

Udell M.A., Dorey N.R., Wynne C.D. What did domestication do to dogs? A new account of dogs' sensitivity to human actions. Biol. Rev. Camb. Philos. Soc. 85: 327-345; 2010.

Wemelsfelder F., Mullan S. Applying ethological and health indicators to practical animal welfare assessment. Rev. Sci. Tech. 33: 111-120; 2014.

Implementare i canili nella prospettiva One Health: è davvero un'attività realizzabile?

Luigi Sacchettino[1§], Claudia Gatta[1§], Alessandra Pelagalli[2,3], Lucianna Maruccio[1], Francesco Napolitano[1,4*], Luigi Avallone[1] and Danila d'Angelo[*1]

[1] *Dipartimento di Medicina Veterinaria e Produzioni Animali-Università degli Studi Napoli Federico II, Napoli; luigi.sacchettino@unina.it (L.S.); lucianna.maruccio@unina.it (L.M.); gattaclaudia@gmail.com (C.G.); Francesco.napolitano3@unina.it (F.N.); avallone@unina.it (L.A.); danila.dangelo@unina.it (D.d'A.)*
[2] *Dipartimento di Scienze Biomediche Avanzate, Università degli Studi Napoli Federico II, Napoli; alpelaga@unina.it (A.P.)*
[3] *Istituto di Biostrutture e Bioimmagini (IBB), Consiglio Nazionale delle Ricerche (CNR), 80131 Napoli: alpelaga@unina.it (A.P)*
[4] *CEINGE-Biotecnologie Avanzate Franco Salvatore 80145 Napoli; napolitano@ceinge.unina.it (F.N.)*
[§] *Questi autori condividono la stessa co-authorship*
[*] *Corrispondenza: (D.d'A): danila.dangelo@unina.it; (F.N.): francesco.napolitano3@unina.it*

Sintesi

In Italia, la gestione del canile nel quadro della One health è spesso difficile da realizzare, principalmente a causa di un generale effetto di sovraffollamento dei cani in canile, insieme al minor tasso di adozione, che gravano in maniera significativa sui costi di gestione. Nel presente lavoro abbiamo cercato di evidenziare l'importanza dell'impiego di strategie integrate e innovative per migliorare la qualità della vita dei cani ospitati, consentendone così una più facile adozione. A tal riguardo, oltre ad intraprendere tempestive azioni per prevenire le malattie più comuni che colpiscono la salute degli animali in canile, emerge la necessità di implementare un accurato programma di riabilitazione comportamentale. In conclusione, sulla base delle nostre precedenti ricerche, riteniamo che una buona gestione dei cani da compagnia nei canili rappresenti una sfida per promuovere il benessere degli animali, e potenziare così il rapporto uomo-cane.