



RESEARCH REPORT

*Evolving Cat Container Design for Aviation:
Systematic Integration and User-Centric Innovations*

Keni Li | N10338811



STATEMENTS

Authenticity statement

This is to certify that to the best of my knowledge; the content of this report is my own work. This report has not been submitted for any subject or for other purposes. I certify that the intellectual content of this report is the product of my own work and that all the assistance received in preparing this report and sources have been acknowledged.

Your name: Keni Li

Student number: N10338811

Date: 9/9/2023

AI use statement

I have utilized Generative AI in this report (Mid Journey, ChatGPT) to assist in various ways. The way I have used Generative AI includes:

Ideation & Conceptualization: 'Mid Journey' was employed to generate innovative of the future landscape of pet airports.

Your name: Keni Li

Student number: N10338811

Date: 9/9/2023



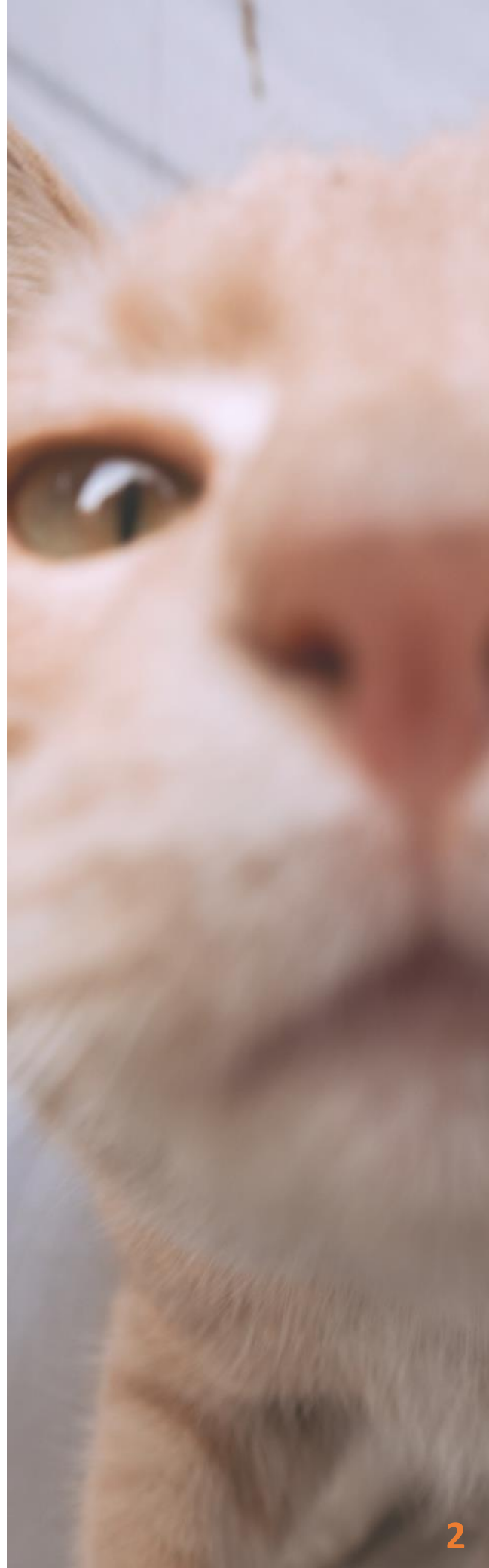
ABSTRACT

In the contemporary era of frequent international travel, the need to ensure pet safety and comfort during air travel has emerged as a prime concern. This study delves deep into feline air travel's multifaceted aspects, amalgamating academic literature and primary interviews to paint a comprehensive picture. The findings underscore the imperatives of acclimatization, stress alleviation, and container design that adhere to stringent guidelines. However, beyond mere container design, the research extends into envisioning premium and economical system designs.

These systems encompass every touchpoint of the journey, from check-in to onboard comfort solutions tailored to different user profiles. By harmonizing insights from varied sources, this study illuminates a path for a future where air travel for pets, especially cats, is safe, comforting, and consistent with human-centred design principles.

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1

INTRODUCTION

1.1 Background & Overview

The aviation industry has seen remarkable growth in the segment of passengers travelling with pets, notably dogs and cats, over recent years (Williams, 2023). As pet owners increasingly opt for air travel with their furry companions, the demand for ensuring their safety and comfort becomes paramount (Condor, 2023). Pets usually travel by air in three ways: in a cabin underneath a seat in a container, in the hold in the luggage department in a crate, or by cargo in a crate (Starwood Pet Travel, 2022). Despite adherence to regulations by international associations such as the International Air Transport Association (IATA), gaps exist in standardized practices across airlines and countries. This inconsistency and often complex or opaque regulations create potential inconveniences

(Trajkovich, 2022). Challenges encompass not only the logistics of transportation but also the animals' safety, welfare, and well-being (Sperry et al., 2022). COVID-19 exacerbated these challenges as regulations tightened and unprecedented situations arose. *A quote from a pet owner: "One such situation is exemplified by a harrowing account: "During the height of the pandemic, my attempt to return to China with my cat led to an unexpected and tragic consequence. With pets being unofficially barred from air transport, a pet relocation company, unbeknownst to me, opted for illegal sea routes. On the brink of being caught, they decided to discard the animals into the sea, including my beloved cat. The emotional toll was overwhelming, but it also highlighted the severe gaps and inadequacies in pet transportation regulations and practices."* (Appendix 7)

1.2 “So What” & Aim of the Project

Pet owners' disturbing experiences underline the pressing gaps and inadequacies within current pet travel systems. The inconsistency in regulations and the diverse quality of pet containers directly influence the well-being, comfort, and overall journey experience of both pets and their owners. Addressing these concerns is not just about the ethical treatment of animals; it also signifies a lucrative prospect for the aviation sector. By enhancing the travel journey for pet lovers, airlines can tap into and nurture this burgeoning segment, potentially leading to enhanced customer retention and loyalty.

This project aims to holistically

revolutionize the air travel experience for cats and their owners, from pre-boarding preparations to the post-flight transition. Drawing upon academic research and real-world insights, the aim is not only designing a cage but also a system that mitigates feline anxiety, ensures regulatory compliance, and addresses practical challenges owners face. By interviewing technology, design innovations, and cat-centred considerations, this project seeks to set new industry standards, fostering a seamless and stress-free journey for the feline passengers and their caretakers. Through this endeavour, the goal is to make air travel feasible and favourable for feline companions and those who care for them.



Figure 1: Structure of the project

2 LITERATURE REVIEW



2.1 Introduction

In Australia, air transport is the most common way to transport animals between major cities (Collins et al., 2023). Similarly, people often use air transport to move their pets from one country to another (Bergeron et al., 2002b). Sea transport is another way that people use to transport livestock. However, unlike traditional sea and land transportation, people need more experience transporting live animals by air (Collins et al., 2023). The behavior, stress level and well-being of live animals during air transportation are the critical factors to be determined, as their factors decide the survival rate and comfort of live animals in the plane (Collins et al., 2023). This literature review aims to collect statistics from existing literature to support the research project. At the same time, this literature will also collect essential factors that caused the incident during live animal transportation to improve the project's design.

Moreover, this literature review will examine the current technologies and designs for pet carry-on cages for air transportation. Through this investigation, several current designs will be discussed. This will include the advantages and the disadvantages of the design. From that, the potential risks will also be discussed. Lastly, this literature review will gather relevant regulations regarding the standards of designing a pet carry-on cage. The regulations will be strictly followed during the project to ensure the designed product can satisfy the requirements of Airline services.

2.2 Key Themes

The trend of pet travel has become popular in past decades. It is becoming essential for pet owners to bring their pets when they

travel and to other cities for study or work (Clur,2022). Williams claimed that more than 4 million pets and live animals are transported by air annually (2022). In 2018, the researcher found that 37% of pet owners had their animals with them while travelling. This was a significant increase compared to 2008 when only 19% of pet owners chose to travel with their pets (Williams, 2023). Researchers found that 70% of American households own at least one pet, and 78% of Americans travel with their pets yearly (Clur, 2022). Behind this huge number of people, most people who travel with pets travel by car to carry them (Clur, 2022). However, more people want to travel further afield, even to a different country. In this context, people can no longer travel with their pets by car or train, so people need to use aeroplanes as a means of transportation, and their pets will also go on board (Williams, 2023). However, it is crucial to determine if pets can travel safely through aeroplanes, as air travel is not a classic way for pets to travel.

Researchers found that Hawaiian Airlines is the airline in the USA that had the most

reported pet deaths during air travelling, with a death rate of 2.02%, and this is followed by United Airlines with a death rate of 1.6%, and Delta Airlines have a death rate of 1.05% and it is followed by American Airlines with a death rate of 0.71% (Williams, 2023). Overall, in 2023, only 0.01% of the pets that travelled by air had the incident, which indicates that 99.99% of the pets that travelled by air had arrived safely (Williams, 2023). At the same time, in 2022, American Airlines reported that 188,223 animals were transported by airlines, and American Airlines reported seven deaths among these animals. The overall incident rate is 0.48 out of 10000. However, it is essential to determine if the pets would suffer in the aeroplane. If most pets do not suffer on the plane, more pet owners would be willing to take their pets on the plane. Bergeron et al. claimed that traditional transportation, such as car and train transportation, caused a significant stress level to animals such as pigs, cattle and horses (2022). Amat et al. claimed that cats are exposed to various stressful stimuli, and environmental changes are the most common stressors. A veterinary checkup was

was performed on the cats to assess their behaviours. Overall, veterinarian examinations were a stressful scenario for cats unfamiliar with pet carriers and automobile journeys (Tateo et al., 2021).

Furthermore, 59% of cats were found to be distressed during automobile trips and 66% during veterinarian appointments. Anxiolytic medicines may be provided before a veterinarian appointment to make transportation and veterinary visits less traumatic for feline patients (Lamminen et al., 2021). Bergeron et al. also found that traditional transportation methods and airfreight introduce significant stress changes to dogs; different doses of sedatives also had no significant effect on dog's stress levels (2022). However, not all pet owners are comfortable with sedating their pets; sedation does not positively affect all pets, and airlines do not allow pets to get medicine during or before the flight. The latest studies suggest that the animal's increased stress level from air travel is likely to increase the chance of death and illness of the animal as well as well-being (Pieracci et al., 2022). Therefore, an alternative way to

reduce the stress level is essential. Jahn & DePorter claim that the most replicable method for reducing the stress of pet air travel is to acclimatize the pet to live in a transport container as pets can significantly reduce stress levels when living in their familiar environment, and the reduced stress level can cause a positive impact on reducing death rate (2023). Jahn DePorter claims that cats are the most common pets people carry on a flight. Therefore, it is crucial to understand the critical factors that cause cat stress. It is found that the unfamiliar environment, the smell of the new environment, visual stimuli, the movement of the plane, and the noise caused by the plane might be the challenges cats face during a flight (2023). Therefore, it is essential to consider how to address these challenges in the design work.

This literature supported the significance of a pet carry-on cage, as it allows owners to bring their pets to the aeroplane without any breach of the rules. At the same time, a well-designed pet carry-on cage will help reduce the pet's stress level while travelling. However, the regulation about designing pet

carry-on cages should be fully complied with. Pet carry-on cages must be designed to provide pets with ample space for natural movement and posture. They need at least 16% ventilation, food and water bowl access, and additional safety features like a second mesh layer. Materials such as fibreglass, metal, rigid plastics, welded wire mesh, and wood are mandated. The container must have absorbent lining, handle a combined weight of pet and container up to 65 kg, and lack mobile wheels. They are folding containers and plastic clips, as fasteners are prohibited. Containers must be marked with "Live animals" and "This way up" signs. Current designs have integrated technology for enhanced animal care, aligning with these regulations (IATA, 2023). Marchese claims that the built-in camera can let the pet owner monitor the pet's behaviour during the flight. The emergency could be identified earlier than the container without a camera, reducing the pet air travel death rate (2022). However, there are no transparent guidelines indicating if electronic devices are eligible to take on board for all domestic or international airlines.

2.2 Conclusion

The increasing trend of individuals travelling internationally with their pets has been noted in the literature, emphasizing onboard experiences. However, a gap exists regarding the detailed exploration of pets' in-flight experiences. Notably, while the count of in-flight pet deaths is minimal, the existing literature identifies flawed cage design and escalated pet stress as prime contributors. A significant mitigation strategy for in-flight anxiety is acclimatizing the cat to the cage before the journey. Furthermore, the review highlights current regulations for designing carry-on pet containers. Considering these findings, this project will specifically focus on improving cat container design and whole systems from customer to airline, ensuring that such designs adhere to these regulations and address the identified concerns.



3

RESEARCH

The essence of comprehensive research often lies in its multifaceted approach, ensuring that varied perspectives and dimensions of a topic are thoroughly explored. In our quest to understand the intricacies surrounding cat carry-on cages during flights, we adopted a dual approach: surveys for general users and in-depth interviews with experts in the relevant industry. This section outlines our research methodologies, the instruments we employed, and the rationale behind our choices.

3.1 Methodology and Methods

- 1. Type of Research:** This report used mixed-method research, amalgamating quantitative and qualitative research techniques (Östlund et al., 2011). This strategy allowed us to gain statistical data while delving deep into the topic's nuanced aspects.
- 2. Surveys for General Users:** Surveys effectively capture broad perspectives in

a standardized format, allowing for quantifiable and generalizable data. Our surveys targeted general users, intending to grasp their experiences, preferences, and concerns regarding cat carry-on cages. Topics ranged from the comfort and safety of cages to the awareness of existing regulations.

3. Interviews with Experts: While surveys provide breadth, interviews offer depth. We conducted structured interviews with a spectrum of experts, including:

- **Airport staff:** For insights into logistical challenges and compliance.
- **International transport service providers:** To understand global standards and practices.
- **Veterinarians:** For a comprehensive view on cat health, comfort, and safety during flights.
- **Cat owners:** To tap into the direct experiences and needs of those who travel with cats.

Each interview was tailored to the expertise of the participant. For instance, design professionals were quizzed on the safety and ergonomics of carry cages, while veterinarians shed light on the physiological and psychological impacts on cats. These interviews aimed to delve into specialized knowledge areas, ensuring that our research was both holistic and detailed.

4. Rationale for the Chosen Tools: Surveys were chosen for their efficiency in collecting data from a large sample size, ensuring representativeness. Interviews, on the other hand, were selected for their ability to capture intricate details, expert opinions, and rich narratives, which are often not possible through surveys alone.

3.2 Limitations

The research, although comprehensive, has inherent limitations rooted in its methodology. The sincerity of survey responses could not be guaranteed, as some participants may need more reflection to rush through. Meanwhile, during interviews, there is a potential for confirmation bias, where answers might align more with perceived researcher expectations than genuine experiences. Additionally, the representativeness of the sample is still being determined. It does not necessarily

mirror the broader cat owner demographic. Finally, while Interviews provide depth, they are also susceptible to interpretation bias, and surveys, with their fixed responses, might miss nuanced experiences. It is vital to consider these factors when interpreting the findings.

3.3 Summary

In this rigorous research endeavour to understand in-flight cat containers, a seamless merger of expansive data from user surveys with intricate knowledge from expert interviews was achieved. A thorough grasp of the subject was obtained by integrating insights from everyday users and professionals in the field. However, it is crucial to recognize the intrinsic limitations tied to the methodologies, such as potential biases in survey responses. Despite these constraints, the balanced research approach provides a robust foundation for the subsequent stages of this project.



4 ANALYSIS & FINDINGS

A meticulous exploration into the nuances of cat air travel combines the precision of survey results with the depth of expert insights and personal anecdotes from interviews. This blended approach offers a panoramic view of cat air travel's current dynamics, challenges, and potential milestones.

4.1 Analysis

A mixed-method analysis was the chosen tool for this exploration, seamlessly combining the quantitative nature of the survey data with the intricate stories and experiences from the interviews (Greene et al., 1989). This synergy paints a more detailed picture, bringing forth patterns, hurdles, and suggesting key innovations.

4.2 Findings

1. Cat Owners & General Users' Experience and Perceptions:

Comfort as the Cornerstone: Every survey

participant (**100%**) supported innovations aimed at amplifying pet comfort in air travel, an idea also echoed in the interview narratives.

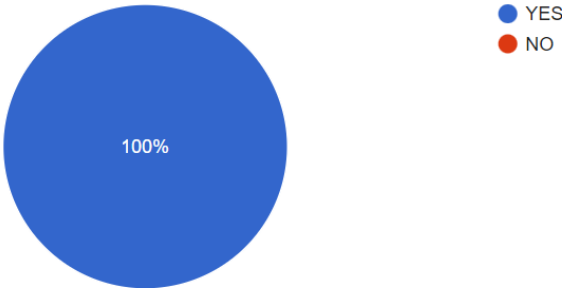


Figure 2: Comfort feature voter

The gap in Regulatory Awareness: An overwhelming **85%** of the survey flagged their unfamiliarity with regional regulations about carry-on pet cages. This statistical revelation is paralleled by the interview account of the individual navigating the intricate regulations between Australia and China.

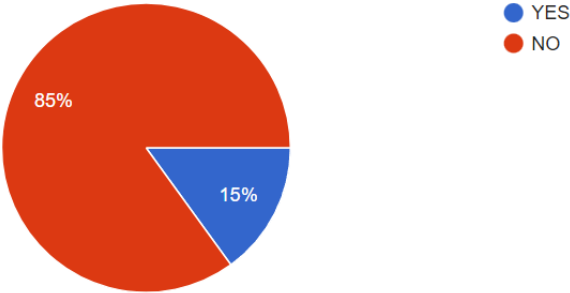


Figure 3: Percentage of regulation awareness

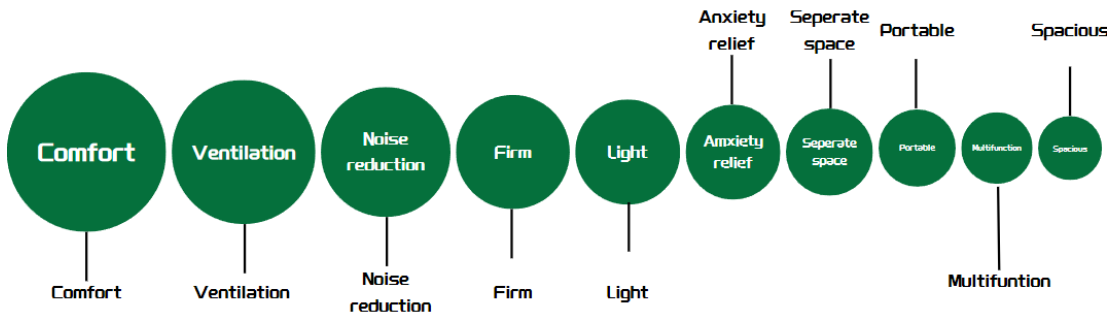


Figure 4: The important features that participant vote

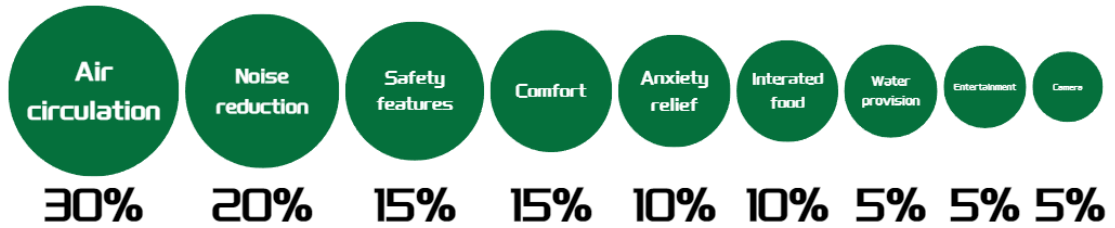


Figure 5: The future features that participant want

Demand for Innovative Carry-On Designs:

The crowd's voice is unanimous. They demand **lightweight, spacious, comfortable** cages that comply with airline norms. Interview insights amplify this demand, with personal anecdotes emphasizing the tangible benefits of such features.

2. Regulations, Compliance, and Airline Support:

Seeking Transparency in Guidelines: One pet owner's journey from Australia to China encapsulates international pet travel regulations' often confusing and maze-like nature—the statistical and anecdotal data advocates for transparent, standardized, and easily accessible guidelines.

The role of Airlines is Central: Airlines find themselves at the heart of this conversation. Personal experiences captured

during interviews indicated varied satisfaction levels, hinting at the vast room for improvement.

3. Design and Innovation in Carry-on Cages:

Desired Features Checklist: Participants of the survey and interviews alike spotlighted a plethora of desired amenities for future cage designs: **noise reduction, enhanced air circulation, robust safety features, integrated food and water provisions**, and more.

Investment Appetite: 60% of respondents are willing to spend between **500 to 3000** AUD for cat air travel solutions, highlighting a significant market opportunity and showing that many prioritize their pet's travel comfort and safety.

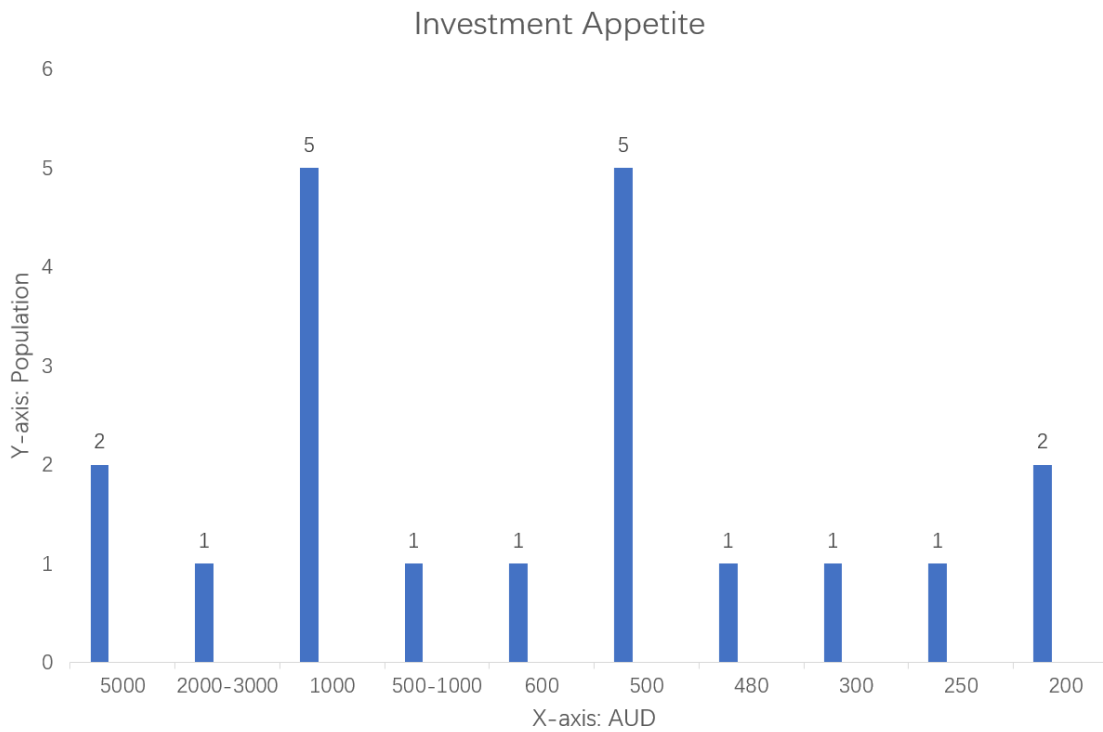


Figure 6: Shows the investment of participant willing to pay

4. Blueprint for the Future:

Expansion of Airline Services: The appeal is heartfelt and straightforward. Interview narratives reverberate with the desire for more airlines to champion pet transportation services, especially for international voyages.

Empowerment through Preparation: One interviewed pet owner's journey illuminated the significance of thorough pre-flight preparation. There is a golden opportunity for airlines and service providers to offer preparatory advisory services tailored to pet owners.

emphasis on comfort, a strong demand for transparent regulations, and an envisioned role of airlines as proactive facilitators. Additionally, there is a clear evolution in the demand for carry-on cage designs. These insights reflect current sentiments and provide direction for the anticipated future trajectory of optimized pet air travel.



4.3 Summary

The comprehensive analysis drawn from surveys and interviews highlights several key findings. There is an unwavering



5

DISCUSSION

The need for an inclusive cat container design tailored to the specific requirements of air travel emerges from the academic literature and primary interviews. The interviews served a dual purpose. They augmented our understanding of the feline flight experience and bridged gaps left by limited academic exploration on the subject.

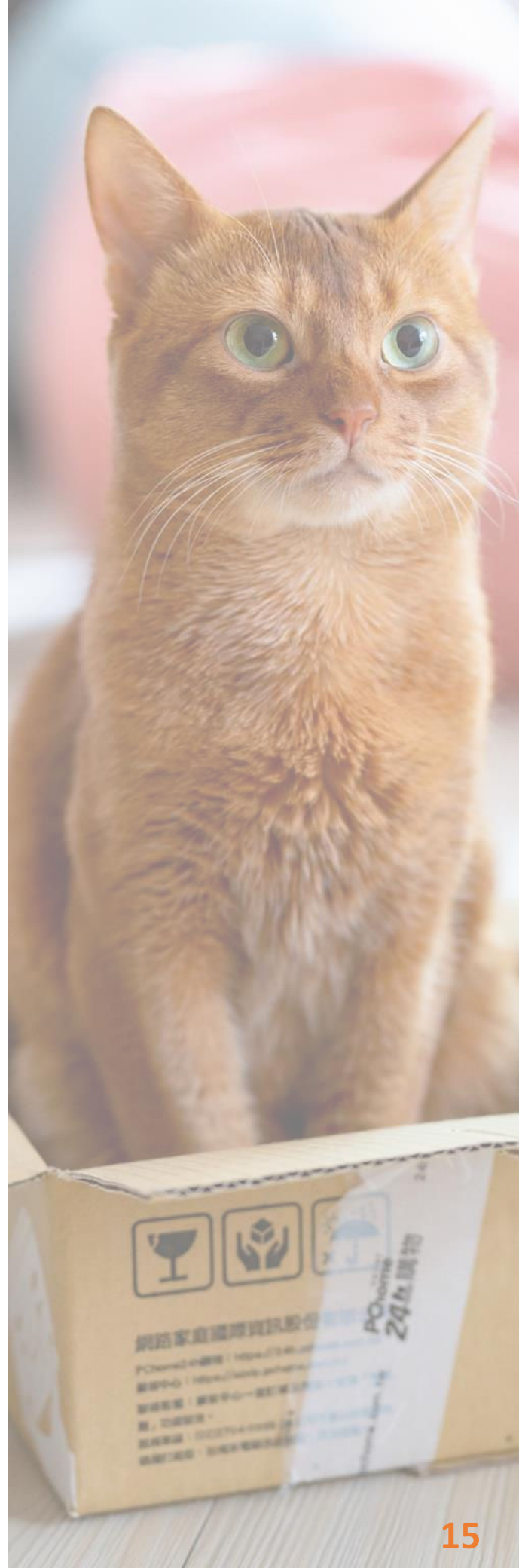
The literature shows that feline anxiety during travel is a salient concern (Bergeron et al., 2022). This anxiety, stemming from unfamiliar environments, resonated strongly in our interview findings. Many pet owners recounted stories of their pets' visible distress, emphasizing a need for designs that actively combat these stressors. To this end, incorporating features such as anxiety diffusers or compartments for the release of familiar scents becomes paramount, underscoring the design's alignment with research and lived experience. The importance of familiarity, as highlighted in Jahn & DePorter's (2023) study, found

resonance in the literature review narratives. Pet owners detailed how their cats were often comforted by familiar items, making a solid case for designs that incorporate elements from the cat's everyday environment. Such integration ensures the seamless transition of a cat from its home environment to the travel container.

However, the power of these interviews lies not in affirming academic findings but in highlighting the areas that need to be addressed by literature. Where academic articles emphasized the physiological challenges cats face, interviews brought forth the psychological dimension, underscoring cats' emotional dependency on their owners. Such insights bolster the case for features enabling pet-owner interaction, for instance, through touch-sensitive screens or partitions. It remains paramount that regulatory compliance is directly by IATA guidelines. While the literature offers guidance, the interview brought forth

practical challenges like mobility constraints. Informed by these accounts, the design could explore alternatives, for example, detachable trolley interfaces seamlessly aligning with airport infrastructure.

In conclusion, design ethos is based on a blend of academic and real-world insights. While literature provides foundational knowledge, interviews fill critical research gaps, enabling a more holistic understanding. The emergent design vision not only aligns with regulatory standards but deeply understands and caters to the unique needs of its feline passengers.





6 DESIGN IMPLICATIONS

The findings underscore the necessity of a paradigm shift in cat carry-on cage design. Design should evolve from a user-centered mindset to a pet-centered ethos. Such a transformation demands an appreciation of not just the physical attributes of these containers but also a keen understanding of the nuanced emotional and psychological landscapes of pets during air travel. Informed by the comprehensive literature review and insights from primary interviews and surveys, design features that cater to both the well-being of cats during air travel and the practicalities of transportation could be prioritised. MUST, SHOULD, COULD, and WONT categories will be listed below.

MUST

- **Regulatory Compliance & Structural Integrity**

- Align with IATA guidelines.
- Ensuring the cage plus cat does not exceed 65KG.

- Materials selected should be fiberglass, metal, rigid plastics, welded wire mesh, solid wood, or plywood.
- Construction should be secured using screws, nuts, and bolts (excluding the use of plastic clips).
- At least 16% of ventilation holes, and second layer needed.
- “Live animal” & “This way up” sign.
- Sit, lie down, turn around and stand easily.
- Leak-proof designs
- Appropriate handle
- **Prevent Visual Stimuli**
 - Limit excessive visual stimuli to prevent anxiety of cat.
- **Acclimatization**
 - Cat-friendly, allow cat to spend time in it before pre-flight to prevent anxiety.

SHOULD

- **Mobility Solutions**

- Lightweight to help owner/service provider move the cage.

- **Interactive features**

- Camera to monitor cat's condition.
- Interact with cat owner to reduce anxiety.

- **Comfort & Familiarity**

- Add mats to mitigate noise.

Familiar items in the cage to prevent anxiety.

COULD

- **Separate Spaces & Additional Structures to enhance the cat's comfort.**

- **Innovative Materials**

- Tough yet lightweight materials to comply with regulatory which also might add value.

WON'T

- **Over-Complexity** could be counterproductive, the cage is to ensure the safety and comfort of the cats.
- **Foldable Designs & Wheels** would be excluded to ensure the cage is stable and adherence to regulations.

With these design implications, the roadmap melds academic insights with practical needs and preferences gleaned from cat owners. The goal remains to create a container that places that cat's comfort at its core while navigating the logistical challenges of air travel.



System redesign

Premium Cat Travel System (in cabin)

1. The Pre-Flight Acclimatization App:

- A dedicated mobile app for cat owners preparing their pets for travel.
- Provides schedules, reminders, and activities to familiarize the cat with its container days before travel.
- Offers virtual meetings with airline pet-care consultants to ensure every requirement is met.



Figure 7: Pre-Flight App

- A digital cat passport system records each flight, behavior notes, and feedback, allowing for tailored services in future flights.



Figure 8: Cat passport

2. Modular Airport Assistance:

- Cat owners bring the cage (without wheels) to the airport.
- Upon check-in, the airline attaches a standardized detachable trolley system to the cat container for easy mobility. This trolley can be used throughout the airport and detached before boarding, complying with IATA guidelines.
- The trolley system incorporates shock absorbers to reduce the stress on the cat during movement.

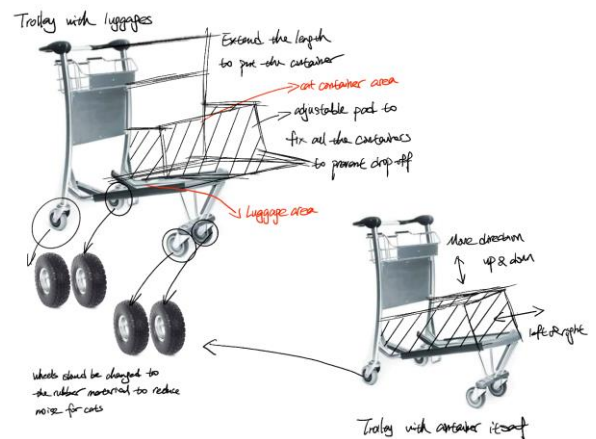


Figure 9: Trolley redesign

3. Feline Comfort Lounges:

- Special areas within airports, akin to VIP lounges for humans, where cats and their owners can relax before the flight.
- These lounges have quiet zones, play areas, snack areas, and assistance from pet care professional.
- Ensures cats are not overwhelmed by the usual airport hustle and bustle.

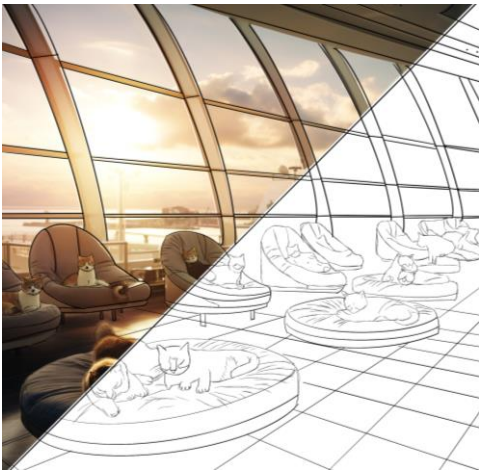


Figure 10: Cat VIP lounges

4. Integrated On-Board Monitoring:

- Each cat container is fitted with a camera and sensory monitor.
- Airline staff and cat owners can access this feed via in-flight entertainment systems or their personal devices. This ensures the owner feels connected and can keep a check on their pet.
- Alerts can be set up if the cats show signs of several distress, promoting cabin crew to check or inform the owner.



Figure 11: Monitor cats from the screen

5. Post-Flight Cat Care Concourse:

- Upon landing, rather than being mixed with general luggage, cats are taken to a dedicated concourse.
- Here, cats are given time to relax and come to terms with the landing in a quiet environment. This concourse would have play zones, resting zones, and care professional.
- Owners can pick their pets directly from this concourse, ensuring a seamless and stress-free end to the travel experience for the pet.



Figure 12: Cat pick-up lounges

Premium Cat Travel System (by cargo)

1. Personalized Pre-Flight Experience:

- A premium lounge provides play area, resting spots, and dedicated staff to ensure cats remain relaxed before the flight.
- A digital cat passport system records each flight, behavior notes, and feedback, allowing for tailored services in future flights.

2. Specialized Cargo Comfort:

- Cats are placed in a premium section of the cargo, ensuring optimal temperature control, soft lighting, and noise insulation.
- Live camera feeds are accessible to owners, allowing them to check on their cats during the flight.

3. Post-Flight Touchpoints:

- Owners are provided access to a feedback portal post-travel, to record observations and provide insights to airlines, assisting in continual service enhancement.
- On landing, cats are promptly moved using specialized carriages to a dedicated collection lounge where owner reunite with them.

Economical Cat Travel System (in cabin)

1. Pre-Flight Preparation:

- Pet owners will receive the notification from airline to double check the guidelines of the container and cat condition.

2. Airport Navigation:

- Clear signages directing pet owners to the right check-in counters and boarding gates for those with in-cabin pets.

3. Detachable Trolley Interfaces:

- Available at a minimal fee, allowing pet containers to be securely attached and transported to the check-in area.

4. In-Cabin Facilities:

- Under-seat spaces (front) designed to fit the cat container securely

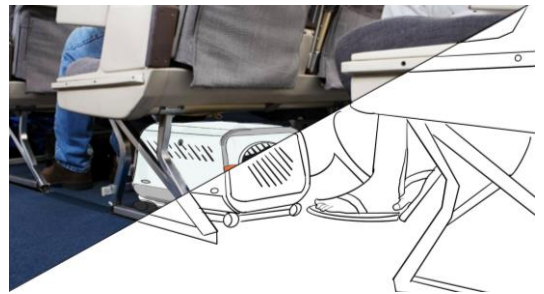


Figure 13: Front seat space

- Basic amenities like a pet relief kit provided.

5. Flight:

- Noise-cancelling headphones available for passengers sensitive to potential pet noises.
- Stewards trained to manage pet-related situations, like offering water or assistance.

6. Post-Flight Retrieval:

- Quick exit pathways for those with pets to reduce the stress on the cat.

Economical Cat Travel System (by cargo)

1. Pre-Flight Preparation:

- Owners provided with guidelines to ensure minimal stress for pets when they are separated during the journey.

2. Airport Navigation:

- Designated check-in counter for pets travelling in the cargo hold.
- Clear signages guiding to these specific counters.

3. Designated Waiting Areas:

- Secure and calm holding areas for cats before they are loaded into the plane's cargo are.

4. Detachable Trolley Interfaces:

- Available at a minimal fee, allowing pet containers to be securely attached and transported to the check-in are.

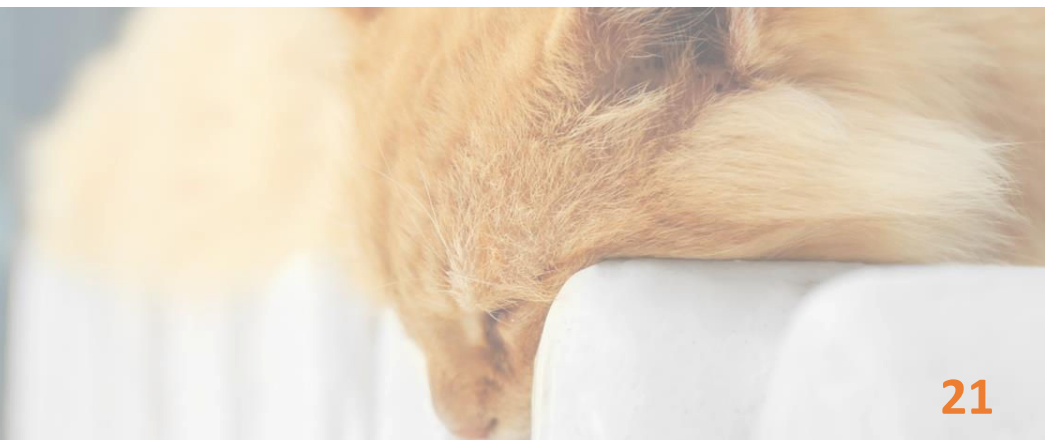
5. Flight:

- Cargo hold areas with monitored temperature and controlled environments
- Cameras allowing flight staff to monitor cats.

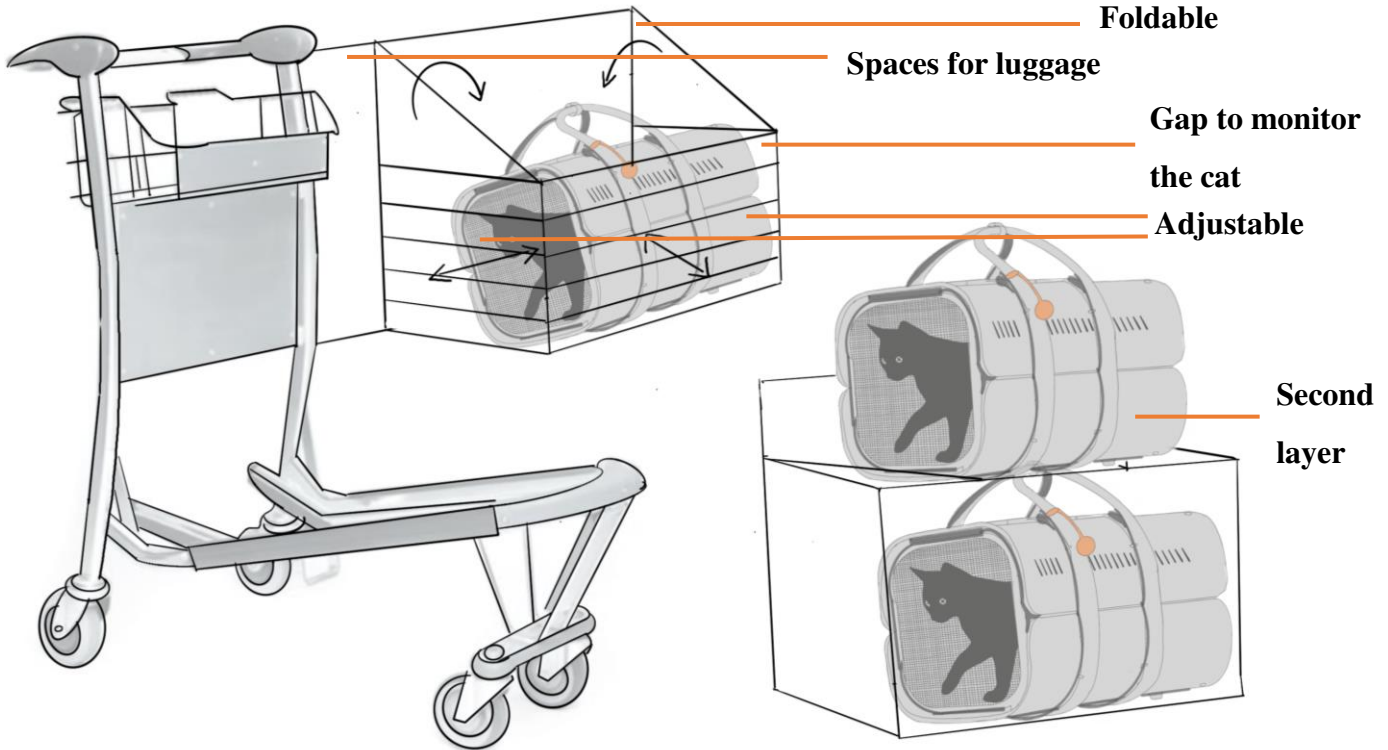
6. Post-Flight Retrieval:

- Dedicated pet collection zones away from the regular baggage carousel to avoid confusion and speed up the process.

The brand-new Pet Travel System represents a transformative approach to feline air travel, catering to both Premium and economic needs. This holistic system recognized pet owners' different financial capacities, ensuring that every cat receives an enhanced travel experience irrespective of budget constraints. From the availability of detachable trolleys for seamless transit to personalized cat-care lounges for those opting for a more luxurious experience, the system balances affordability and luxury. Combining state-of-the-art technologies, practical amenities, and the expertise of cat-care professionals, it not only safeguards the well-being of our feline companions but also offers pet owners choices that align with their preferences and financial capabilities. This comprehensive approach transcends conventional pet travel, making journeys more inclusive, stress-free, and tailored to diverse needs.



Concept 1: Trolley redesign



Inefficient use of space in airport trolleys for pet transportation and monitoring challenges.

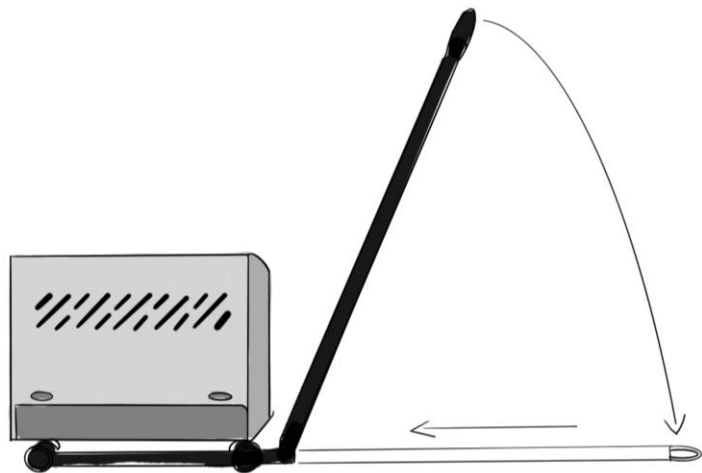
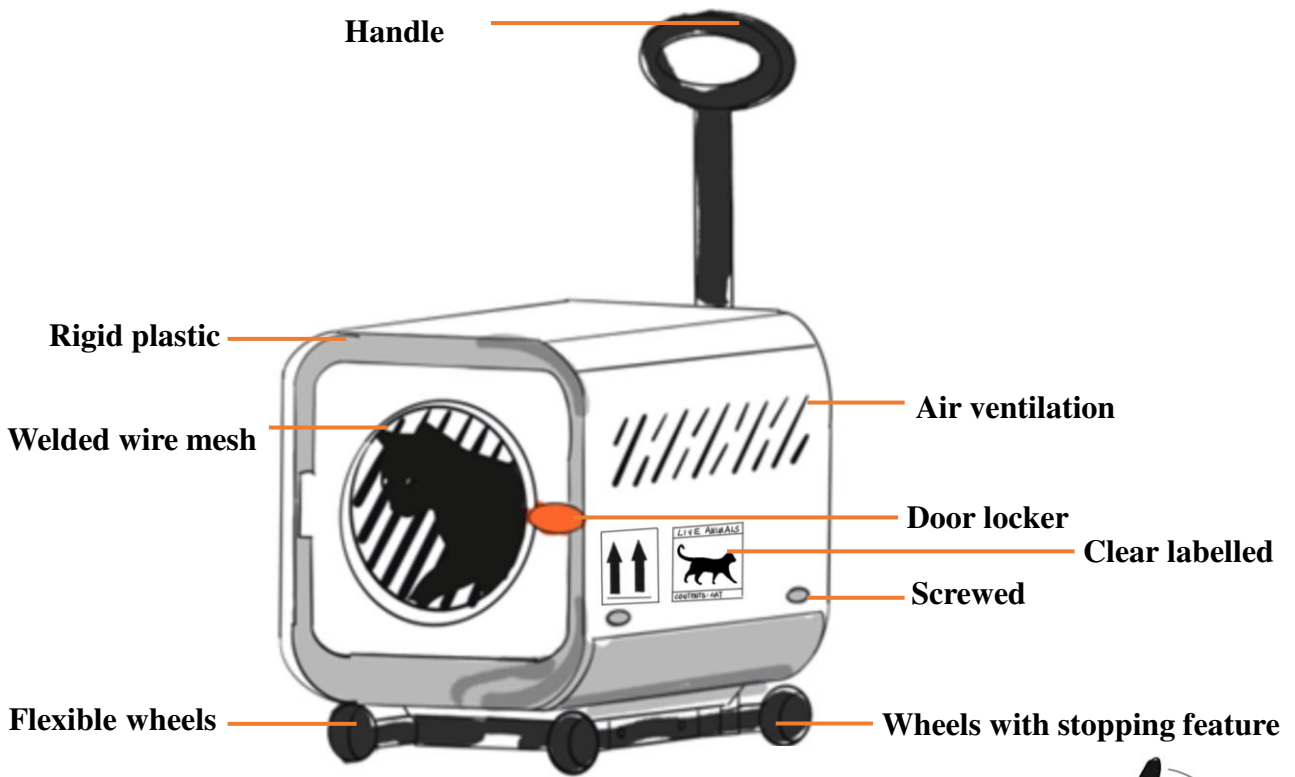
Key problems targeted

- Limited trolley space
- Multiple pet accommodation
- Safety and stability
- Inconsistent container sizes

Special Features

- Expanded area for extended luggage
- Designated pet area with adjustable features to fit the containers with IATA limitations
- Second layer for passengers with multiple pets
- Columns for passengers to easily monitor their pets, instead of a fully covered space.

Concept 2: Under seat container design with camera



Limited space and mobility concerns in economic seating.

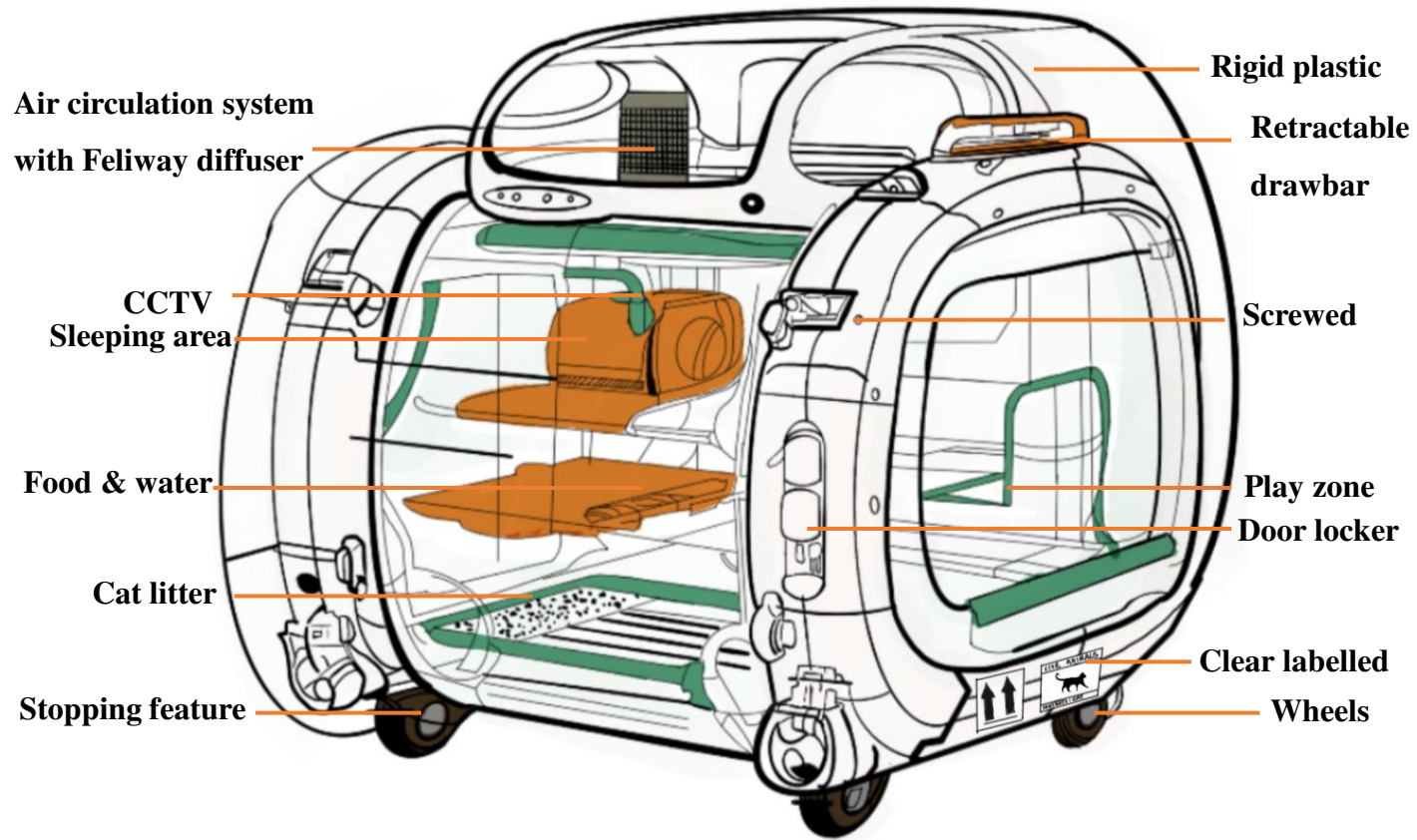
Key problems targeted

- Mobility at the airport and onboard
- In-flight storage limitations
- Safety concerns
- Visibility and air circulation
- Ease of access

Special Features

- Flexible wheels for airport use and a foldable wheel handle for easy transport
- Shadowed design with adequate ventilation
- Welded wire mesh door
- Screwed structure with a door locker

Concept 3: High-tech container in cargo with camera



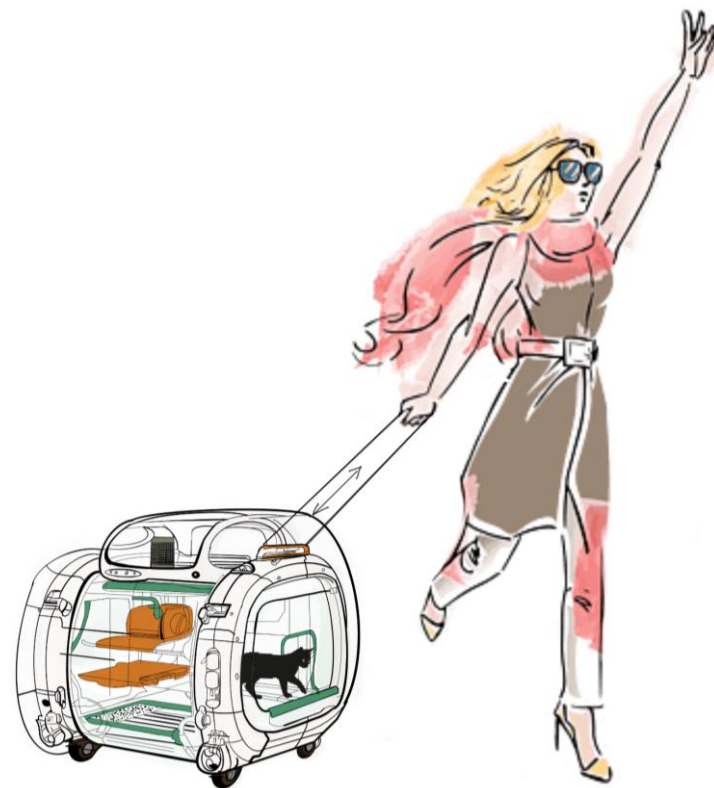
The current pet containers don't offer a holistic experience for pets.

Key problems targeted

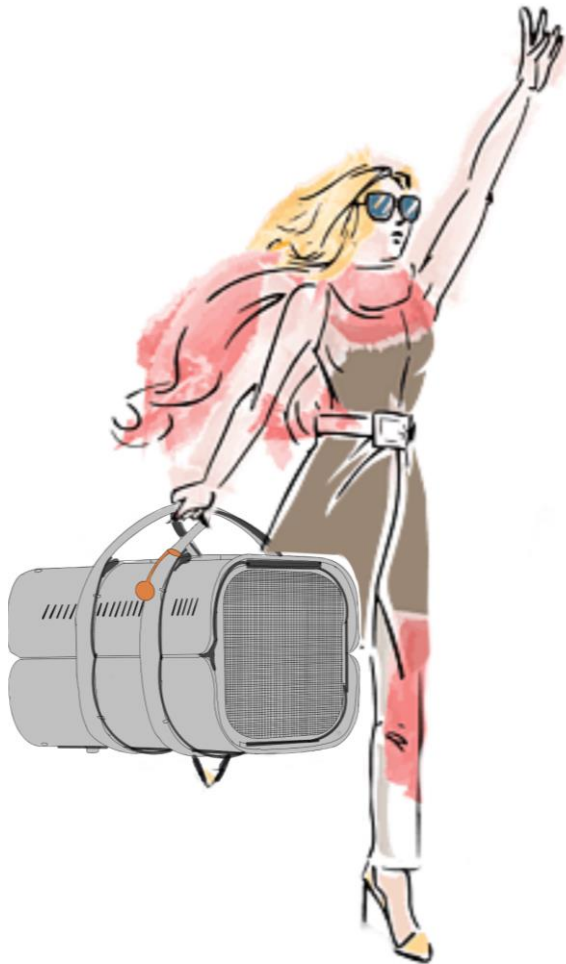
- Lack of monitoring
- Poor air circulation
- Confinement stress as cats typically experience stress in unfamiliar environment.
- Mobility
- Security that cats sometimes escape from poorly secured cages which can be dangerous during transit.
- Stress from overexposure

Special Features:

- Air circulation system with Feliway diffuser
- CCTV monitoring
- Separated zones
- Moving wheels with a retractable drawbar with a stopping feature
- Screwed structure with a door locker
- Made of rigid plastic



Concept 4: Economic container in cargo with camera



Concerns about pet safety and identification in cargo areas.

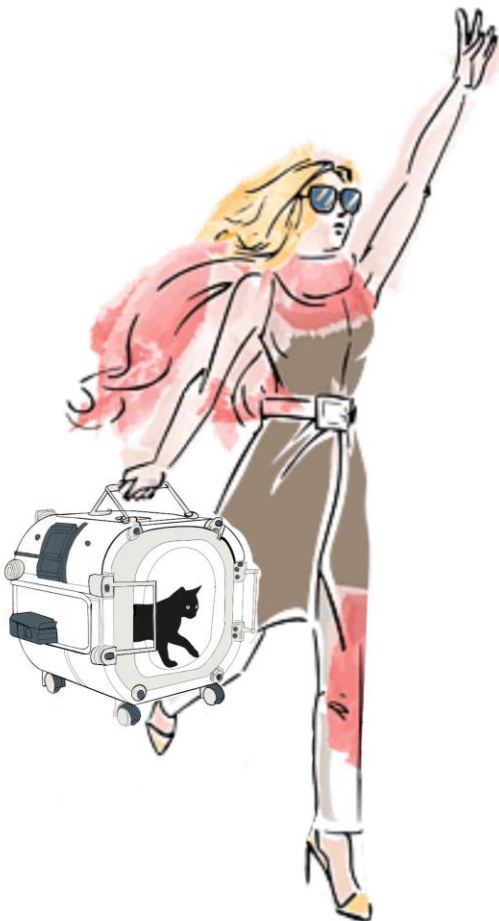
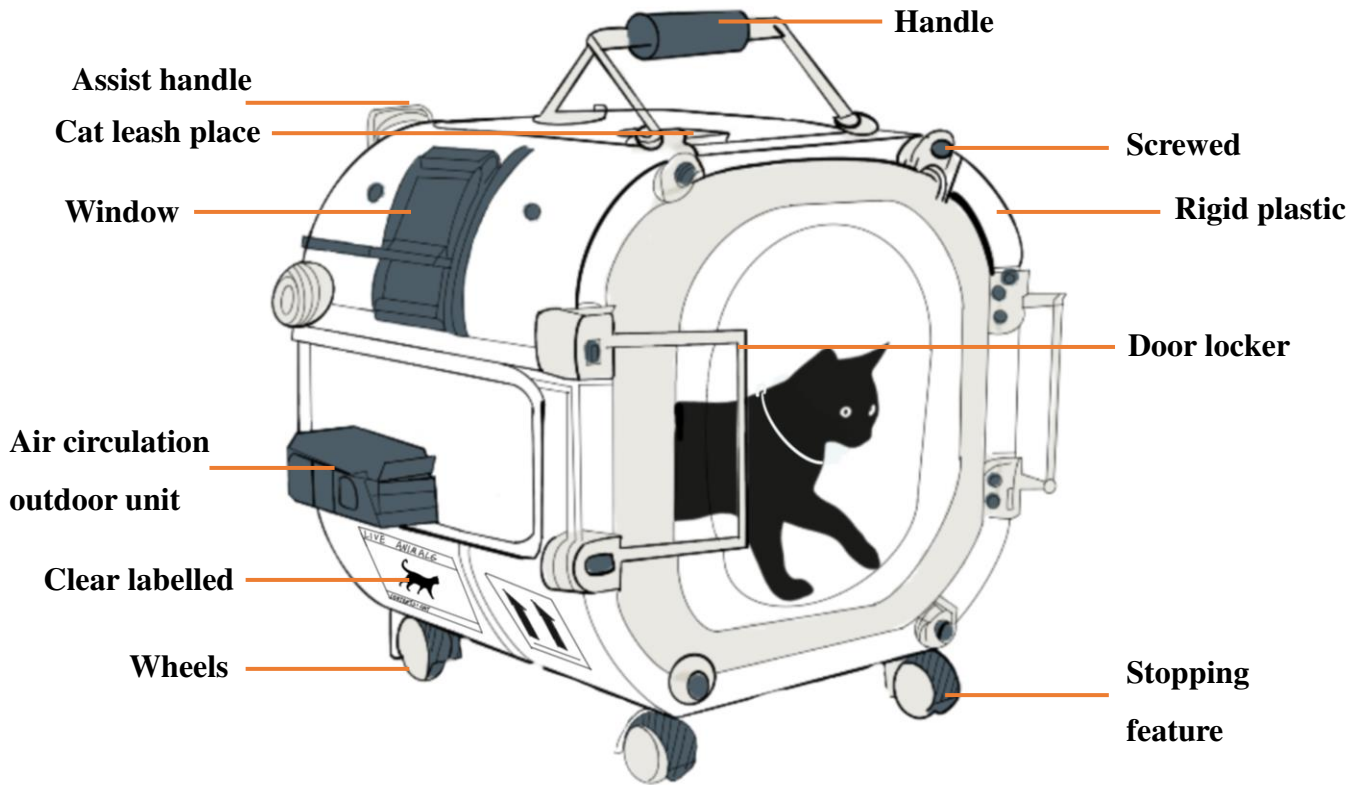
Key problems targeted

- Security in cargo
- Handling challenges that traditional containers can be slippery and difficult to carry.
- Ventilation issues
- Identification
- Stress from overexposure that this container designed maximum shadowed space for cats.

Special Features:

- Extra belts for added security
- Rubber handle for easy holding
- Welded wire mesh door with tiny holes for security
- Cat ID tag for identification
- USB fan for ventilation
- Non-slip stand

Concept 5: Premium container in cabin with camera



Varying airline policies regarding pet movement within the passenger area.

Key problems targeted

- Restrictive airline policies that some of the airlines does not accept pets to get out from the container, this is a flexible solution.
- Safety concerns that pets might cause disruptions when they get out of the container.
- Mobility & Handling
- Limited interaction
- Ventilation
- Stress from overexposure

Special Features:

- Optional cat leash for airlines that allow pet interaction
- Wheels for convenience and stopping feature
- Double handles like human luggage
- Slidable window for interaction and monitoring
- Air circulation system

Contexts of 5 concepts



Concept 1: Trolley Redesign



Concept 2: Under Seat Container



Concept 3: High-tech Cargo container Design



Concept 4: Economic Cargo container Design



Concept 5: Premium in cabin container design



7

CONCLUSION

The relationship between cats and their owners, particularly within air travel, necessitates an evolved approach to feline travel design. By exploring existing academic literature and the enriching perspectives gathered from interviews, this report illuminated the multifaceted challenges faced by feline passengers and their guardians.

The literature consistently highlighted the importance of pre-travel cage adaptation, noise mitigation, secure designs devoid of wheels or foldable components, and the crucial role of familiar elements in alleviating anxiety. Complementing this, the primary research through interviews and surveys unveiled a deeper layer of psychological needs and dependencies, emphasizing the significance of interactive elements, material considerations, and space requirements. While these findings were the foundation, several design implications emerged. They were categorized into essential (MUST), desirable (SHOULD),

potential enhancements (COULD), and exclusions (WON't), providing a structured roadmap for innovation. In translating these implications into actionable designs, five pioneering concepts were conceived. These solutions span from owner-centred design, ensuring ease of handling and feline familiarity, to airline-integrated systems that reimagine the entire travel trajectory, including dedicated feline lounges and airport assistance tools like detachable trolleys.

The envisioned changes are not only a product but reforming an experience. It endeavoured to shift perceptions, making air travel for cats not a last resort but a feasible, enjoyable choice. By merging academic insights with real-world narratives, this report paves the way for a future where air travel respects our beloved feline companions' emotional and physical needs, fostering a memorable journey for all the right reasons.



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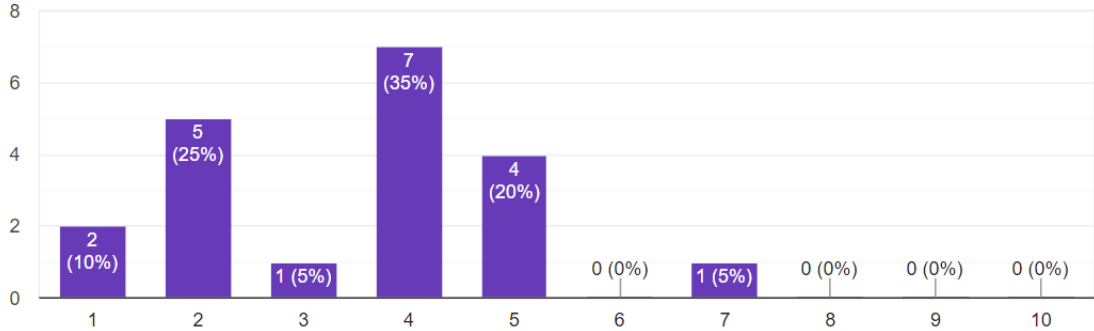
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9 APPENDIX

Appendix 1: Surveys

Design and Safety

1. On a scale of 1-10, how would you rate the current carry-on cage designs for pet comfort?

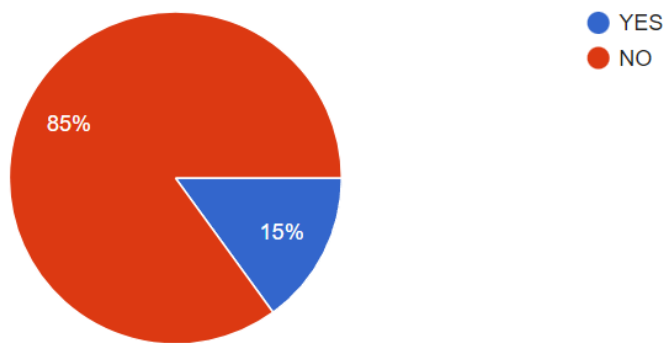


2. What three features would you consider most important for a carry-on cage design?

Simple, Functional, Safe, Oxygen, Stress response, Spacious, Divided, Convenient, Easy to carry, Large enough space, Comfortable, Noise reduction, Pet soothing, Multifunctional, Lightweight, Firm, Breathable, Comfortable, Strong, Portable, Easy cleaning, Ventilation.

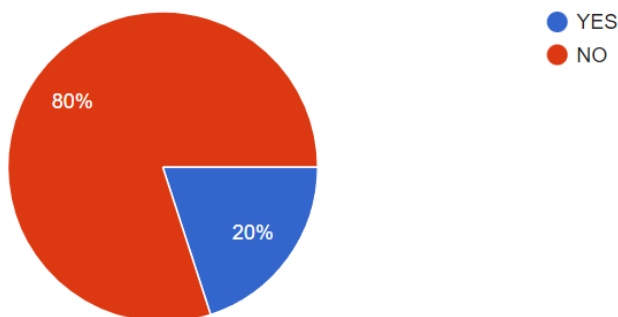
Regulations and Compliance

1. Are you aware of the current regulations for carry-on pet cages in your region? (Yes/No)

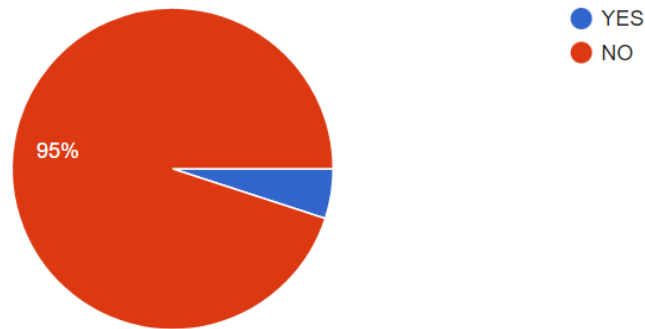


Human Factors and Passenger Experience

1. Have you ever traveled with a pet? If yes, please describe your experience.

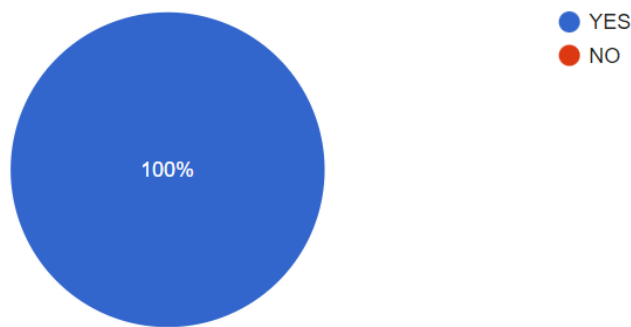


2. Have you ever experienced discomfort due to animals on a flight (e.g., allergies)? (Yes/No)



Innovation and Future Directions

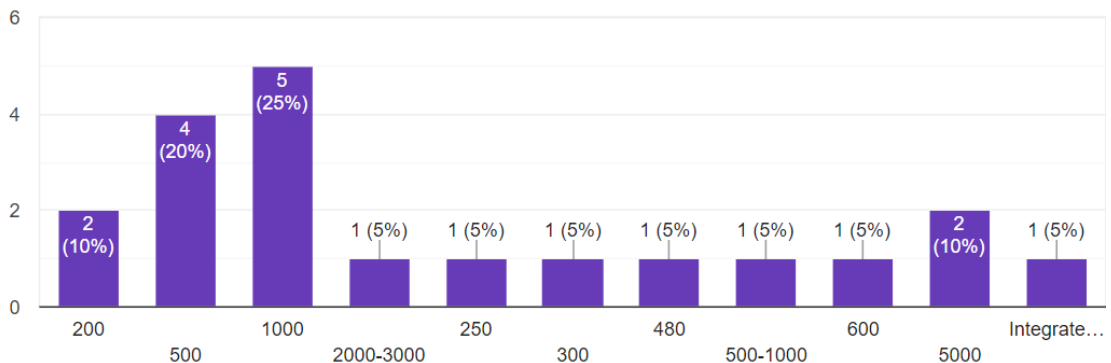
1. Would you support innovations in carry-on cage designs that enhance pet comfort? (Yes/No)



2. What features would you like to see implemented in future carry-on cage designs?

Safe, Easy to stack, Oxygen, Noise reduction, Entertainment, no stress, Pets allowed, Dog-only space, Entertainment, Comfort, Explosion-proof, Anti-theft, Self-boarding, Positioning, Automatic sorting, Sitting, preferably with a pull rod and wheels, Air circulation, Provide water and food for pets.

3. How much would you be willing to pay for a brand-new updated carry-on cage with enhanced comfort and safety features for pets? (AU\$)



Appendix 2: Interviews

Interviews for staff working at airport

Interaction with Passengers and Pets↵

1. Can you describe your typical interactions with passengers traveling with pets?↵

We usually assist passengers in ensuring their pet's carry-on cage fits within the airline's specifications, guide them through the security process, and occasionally answer questions or help in boarding.↵

2. Have you received any complaints or compliments from passengers about pet carry-on cages? Can you share examples?↵

We've had passengers complain about the size restrictions, claiming they're too small for their pets. Some passengers have praised us for the care and attention we give to them and their pets during the check-in and boarding process.↵

Safety and Comfort Considerations↵

1. What safety measures are in place to ensure the welfare of pets during travel?↵

We make sure the cages are secured and stable during handling. For pets traveling in the cargo hold, we ensure that the environment is well-ventilated, and temperature controlled.↵

2. How does the current design of carry-on cages impact the handling and care of pets at the airport?↵

Properly designed cages make the handling process smoother, reducing stress for both the pet and our staff. Flimsy or oversized cages can complicate handling and storage.↵

Observation of Carry-on Cage Designs↵

1. What variations in carry-on cage designs have you observed?↵

We see a mix of soft-sided carriers, hard-shell cages, and even some DIY setups.↵

2. Have you noticed any designs that seem more effective or problematic?↵

Hard-shelled cages with proper locks are generally more secure and preferable for the cargo hold. Soft-sided ones, although suitable for cabin travel, sometimes lack durability.↵

Training and Support↵

1. What training or guidance have you received regarding the handling of pets and

their carry-on cages?↵

We undergo a basic training program about the handling of pets and cages, which covers safety protocols, animal behavior, and emergency situations.↵

2. Do you feel adequately supported and trained to manage pet travel at the airport?↵

While the training provides a foundation, real-world experiences vary, and sometimes we face situations that weren't covered in training. Continuous refresher courses would be beneficial.↵

Collaboration with Airlines and Other Authorities↵

1. How do you coordinate with airlines and other authorities regarding pet travel and carry-on cage requirements?↵

We receive guidelines and regulations from airlines and other authorities and ensure we adhere to them during our operations.↵

2. Can you describe any collaborative efforts to improve pet travel experiences?↵

Occasionally, we participate in workshops or meetings with airline representatives to discuss ways to improve the pet travel experience.↵

Innovation and Suggestions↵

1. Based on your experience, what improvements would you suggest for carry-on cage designs?↵

A universal cage design standard would streamline processes. Integration of tech features for monitoring pets can also be beneficial.↵

2. Are there any innovative practices or ideas you've seen or thought of that could be implemented?↵

Some airports have started implementing pet-relief zones, which seem to be a positive step forward.↵

Ethical and Welfare Considerations↵

1. How are ethical considerations and animal welfare prioritized in the current procedures and regulations?↵

Animal welfare is paramount. While our main job is to ensure human passenger safety, we're equally committed to ensuring the well-being of pets.↵

2. Are there any specific guidelines that you follow to ensure the humane treatment

of pets during travel?↵

We follow the airline's guidelines, which usually align with global best practices for animal handling and care.↵

Conclusion and Final Thoughts↵

1. What are the most rewarding and challenging aspects of dealing with pet travel and carry-on cages in your role?↵

It's rewarding to see pets and their owners happily reunited after a flight. Challenges arise when dealing with poorly informed pet owners or inadequate cage designs.↵

2. If you could change one thing about the current system or regulations regarding pet travel, what would it be?↵

Implement a universal standard for pet carry-on cages to ensure consistency and the best care across all airlines.↵

Appendix 3: Interviews for international transport service providers

Understanding the Current Scenario:↵

1. How does your company manage the transport of pets internationally?↵

Mainly direct management to ensure that all staff understand pet habits.↵

2. What are the current challenges faced in the international transportation of pets?↵

At present, the main challenge of international transportation is to overcome the fact that all airlines can enter the cabin and make pet-friendly flights.↵

Regulations and Compliance:↵

1. How do regulations differ across various countries and regions you operate in?↵

Entry and exit laws and regulations vary from country to country.↵

2. What challenges do you face in ensuring compliance with different international regulations related to pet transport?↵

It is necessary to comply with the different entry and exit requirements of different countries, and pets in some countries have to face transit when they enter the country.↵

Customer Needs and Preferences:↵

1. What are the most common needs and preferences of customers who travel internationally with their pets?↵

The most important thing about the pet transport cage is to make the pet comfortable during the journey, and to have enough water to supplement the pet.↵

2. How does your company address these needs?↵

We try our best to match pets with a large enough and comfortable air box, and freeze bottles to supplement water for pets to cool down.↵

Design and Safety Considerations:↵

1. What are the key features that you believe are essential for a carry-on cage for international travel?↵

The key function is that the space is comfortable, and the diet is arranged in partitions, and the defecation can be well isolated.↵

2. What safety considerations must be taken into account for the design of carry-on cages for international use?↵

The most important thing for a dog with a good bite force is to use a strong material. Once the dog bites, the consequences will be disastrous; the second is to use a lighter material, which is easy to handle during transportation.↵

Innovation and Future Directions:↵

1. How do you see the future of international pet transport evolving?↵

The future development is very promising. Pets are a very good market, giving people a high emotional value. The future pet market will definitely be larger, and the global immigration and studying abroad market also has great potential for development.↵

2. What innovations or changes would you like to see in carry-on cage designs to better serve the needs of international travel?↵

I hope the air box is lighter and more diverse in size to match pets of different sizes.↵

Collaboration and Partnership Opportunities:↵

1. Would your company be interested in collaborating on or adopting new carry-on cage designs?↵

Interested in supporting new ideas and designs.↵

2. How can designers and transport service providers work together to improve the international pet travel experience?↵

Maintain communication, transportation practice and design should maintain communication, and come up with better solutions and products through continuous trial and error.↵

Appendix 4: Interviews for veterinary

Understanding of Pet Travel Health and Welfare[←]

1. What are the common health and welfare considerations for pets during travel, particularly air travel?[←]

Air travel can expose pets to a variety of stressors including unfamiliar noises, pressure changes, and potentially long durations of confinement. Common concerns include dehydration, anxiety, motion sickness, and in rare cases, hypoxia.[←]

2. How do current carry-on cage designs impact the health and welfare of pets during travel?[←]

A poorly ventilated or overly confined cage can elevate stress levels, leading to increased heart rates, panting, or even aggressive behavior. On the flip side, a spacious, well-ventilated, and familiar cage can mitigate some of these stresses.[←]

Interaction with Pet Owners[←]

1. What advice or guidance do you typically give to pet owners who are planning to travel with their pets?[←]

I usually recommend acclimating pets to their cages well before the travel date. Additionally, hydration is key, so ensure access to water, and avoid feeding them a large meal right before the flight.[←]

2. Have pet owners shared any experiences or concerns with you regarding pet travel and carry-on cages?[←]

Many pet owners have mentioned the challenge of finding a balance between a cage that's spacious yet compliant with airline regulations. Some have also voiced concerns over the handling of pets by airline staff.[←]

Safety and Comfort Considerations[←]

1. From a veterinary perspective, what features are important in a carry-on cage to ensure the pet's safety and comfort?[←]

Ventilation is paramount. Sturdy locks, spill-proof water and food containers, and soft padding can also enhance comfort and safety.[←]

2. Are there specific breeds or types of animals that require special attention or

consideration during travel?↵

Brachycephalic breeds like Bulldogs or Persian cats need extra care due to their respiratory structures. Older pets and those with underlying health conditions also require additional considerations.↵

Observation of Carry-on Cage Designs↵

1. What variations in carry-on cage designs have you observed or encountered?↵

I've seen everything from soft-sided carriers to hard-shelled ones. Some now incorporate smart tech for monitoring temperature, humidity, and pet activity.↵

2. Are there any particular designs that you believe are more or less suitable for pet travel?↵

Designs that prioritize ventilation, space, and comfort without compromising safety are best. Hard-shelled cages with secure locks are generally preferred for the cargo hold, while soft-sided ones can be suitable for cabin travel.↵

Collaboration with Airlines, Airports, and Authorities↵

1. Have you collaborated or consulted with airlines, airports, or other authorities regarding pet travel regulations or carry-on cage requirements?↵

I've been involved in seminars organized by airlines and pet travel companies to discuss best practices and guidelines.↵

2. Can you describe any initiatives or efforts to improve pet travel from a veterinary perspective?↵

There have been concerted efforts to train airline staff about pet behavior and handling. Some airports are also introducing pet-relief areas.↵

Medical Emergencies and Treatment↵

1. Have you treated any animals that experienced medical issues related to travel or carry-on cages?↵

I've seen cases of dehydration and anxiety-related behaviors post-travel. There have also been instances of injury due to poorly designed cages.↵

2. What measures can be taken to prevent or respond to medical emergencies during pet travel?↵

A pre-travel vet checkup is essential. For anxious pets, a mild sedative might be

prescribed, though this isn't always recommended.↵

Innovation and Suggestions↵

1. Based on your professional experience, what improvements or innovations would you suggest for carry-on cage designs?↵

Integrating technology to monitor and alert pet owners about conditions inside the cage in real-time would be invaluable.↵

2. Are there any new developments or research in veterinary medicine that could be applied to pet travel?↵

There's ongoing research on the impacts of different sedatives on pets during air travel, as well as studies on the effects of vibration and pressure changes.↵

Ethical and Welfare Considerations↵

1. How are ethical considerations and animal welfare integrated into your guidance and practice regarding pet travel?↵

Ethical considerations are always paramount. I advise against air travel for pets unless it's absolutely necessary, given the potential stressors.↵

2. What are the key challenges in ensuring the humane treatment of pets during travel, and how can they be addressed?↵

Ensuring pets are treated as sentient beings and not just "cargo" is a challenge. Proper training for all involved in pet transport can address many of these concerns.↵

Conclusion and Final Thoughts↵

1. What are the most critical aspects of pet travel that need attention or improvement from a veterinary standpoint?↵

The integration of technology, strict adherence to guidelines, and proper staff training are areas needing urgent attention.↵

2. If you could change one thing about the current system or practices regarding pet travel and carry-on cages, what would it be?↵

A universal standard for pet travel and carry-on cages that is adopted by all airlines would be a game-changer, ensuring consistent care and handling regardless of the airline.↵

Appendix 5: Interviews for Pet Owners Who Have Traveled by Flight with Their Pets 1

1. Can you briefly introduce yourself and tell us about your pet?↵

Cat for two years↵

2. Why did you decide to travel by air with your pet?↵

Be responsible for pets↵

3. How did you prepare your pet for the flight?↵

Bring cat litter, cat food and water bowls, prepare customs clearance materials and air tickets↵

4. What kind of carry-on cage or container did you use? Was it according to airline specifications?↵

Soft bag, specified by the airline↵

5. Describe your pet's condition and behavior during the flight.↵

He hid in the cat bag the whole time while waiting for the plane. After getting on the plane, he was afraid. He would get out to get familiar with the environment. After he calmed down, he took the initiative to return to the cat bag↵

6. How supportive was the airline in handling your pet's needs?↵

Allowed to be brought into the cabin, others not↵

7. How did your pet adjust after the journey? Any noticeable changes in behavior or health?↵

Adapted well, no change↵

8. Based on your experience, would you choose to travel by air with your pet again? Why or why not?↵

Try not to bring it, the cat is easily frightened↵

9. What advice would you give to someone considering flying with their pet?↵

Make decisions based on your kitten's physical condition↵

10. Any additional comments or insights about pet air travel you'd like to share?↵

Nothing↵

Appendix 6: Interviews for Pet Owners Who Have Traveled by Flight with Their Pets 2

1. Can you briefly introduce yourself and tell us about your pet?↵

A short-haired Ragdoll cat (the first time to fly) and an Australian short-haired cat (have made several flights within Australia before).↵

2. Why did you decide to travel by air with your pet?↵

After returning to China for a few months, I plan to raise the cat in China, and it will be more reassuring to have someone to take care of it.↵

3. How did you prepare your pet for the flight?↵

Get F3 and rabies vaccine (rabies vaccine is very scarce in Australia, because there is no rabies in Australia, but China Customs requires it) to submit an export application to the Australian Ministry of Agriculture, do take-off inspection, get a license, buy pet accommodation, etc.↵

4. What kind of carry-on cage or container did you use? Was it according to airline specifications?↵

The cat bag for the light Ragdoll cat in the cabin, and the air box for the medium one that meets the airline regulations.↵

5. Describe your pet's condition and behavior during the flight.↵

During the flight, the cat in the cabin was fine and not afraid.↵

6. How supportive was the airline in handling your pet's needs?↵

Normal support, remaining space↵

7. How did your pet adjust after the journey? Any noticeable changes in behavior or health?↵

After returning to China, the pet has adapted well and has been fed imported cat food.↵

8. Based on your experience, would you choose to travel by air with your pet again? Why or why not?↵

I will not take them on the plane for the time being, because the family will take care of them.↵

9. What advice would you give to someone considering flying with their pet?↵

Do a good job in advance to understand the requirements, prepare all materials, do not make temporary plans and act in a hurry.↵

10. Any additional comments or insights about pet air travel you'd like to share?↵

I hope that more airlines will open pet transportation services to help people in need bring their pets home.↵

Appendix 7: Interviews for Pet Owners Who Have Traveled by Flight with Their Pets

During the COVID time, I needed to go back to China, so I used legal channels to bring the cat back to China. Pets were not allowed to be transported during that time, but the pet company sent pets to be smuggled by sea without telling us. As a result, when they were about to be caught at sea, they threw all the cats and dogs into the sea. Because if it is not thrown into the sea, one cat will let them be sentenced to six months in prison. If it is thrown into the sea, it will not be held responsible. When we know about it, it's when the Hong Kong police to contact us. When I encountered this incident, my first reaction was to tell everyone around me not to use this company, and this company tried to get me to sign a silent agreement, but I refused. I spent a total of nearly \$20,000, in exchange they killed my cat. And so far, their company has not had any influence. It can only be said that the law cannot solve all problems, because the country's protection of pets is too poor, and the company only lose money, they don't even need to pay an extra penny.←

Appendix 8: IATA guidelines

CONTAINER REQUIREMENT 1

The illustrations shown in this Container Requirement are examples only. Containers that conform to the principle of written standards for the species but look slightly different will still be considered compliant with IATA minimum standards.

IATA activities are limited to the development of standards for the acceptance, packing and handling of live animals for transportation by air. IATA does not certify, approve, endorse, or sell any particular pet container manufacturer, brand, make, or model. Equally so, IATA does not offer, solicit, endorse, or approve any particular pet or puppy transport or relocation services, regardless of whether these are offered via email or the internet. Readers should pay attention to fraudulent offerings that claim the opposite.

Applicable to:
Cats (domestic)
Dogs (domestic)

STATE VARIATIONS: CHG-01/03/04, GBG-01/02/03/04/05, HKG-01, NZG-01, SAG-02, ZWG-02/03/04, EUR-01, USG-Variations

See exceptions AUG-01 and NZG-01 in Chapter 2; Some state regulations require that the container must be sealed during transportation.

OPERATOR VARIATIONS: AC-03/04/07, AF-01, CX-05/06/07, EI-01, EK-05/07/08/12, GF-03/06/10/11, KL-01/02/08/09, LH-06/08/10, LX-05/07, MK-02, MS-01, CK-01/05, PR-01/03/04/05/06/07/08, TG-01, QF-02/03/04/07, UA-07/08/09

AC-01 and QF-01 in Chapter 3; Certain operators will not carry wooden containers.

Note:
For carriage of domestic pets in passenger cabins as accompanied baggage see Chapters 2 and 3.

For animals travelling in the aircraft cabin the travelling non-rigid container must:

- Meet these container requirements except that the container construction does not have to be rigid and spacer bars are not required.
- Allow the animal contained in the container to have enough space to turn about normally while standing, to stand and sit erect, and to lie in a natural position.
- The ventilated area must be at least 16% of the total surface of the four sides of the containers.
- The container must be clearly marked with a LIVE Animal label and the label must not block any of the ventilation openings.
- Meet these container requirements except that the container does not need to have water and food containers.
- The requirement for one end of the container to be welded wire mesh does not apply to soft-sided containers.

The check-in staff is responsible for ensuring the container meets the IATA requirements. Should the container not meet the minimum standards the animal must not be allowed to travel.

1. CONTAINER CONSTRUCTION

Principles of Design

The following principles of design must be met in addition to the General Container Requirements outlined at the beginning of this chapter.

The interior of the container must be smooth with no protrusions that the animal can bite or scratch to cause damage to the integrity of the container in any way.

All openings must be nose and paw proof to avoid injury to the animal and handlers.

Openings must be a maximum of 25 mm x 25 mm (1 in x 1 in) for dogs and 19 mm x 19 mm (¾ in x ¾ in) for cats. The openings may have to be smaller in order to be nose and paw proof.

If a container has wheels, they must be removed or rendered inoperable.

Materials

Fibreglass, metal, rigid plastics, welded wire mesh, solid wood or plywood.

All wood used for the construction of containers for international transport must comply with IPPC standards.

For all containers the welded wire mesh must be 2.5 mm or thicker for dogs and 2.0 mm or thicker for cats.

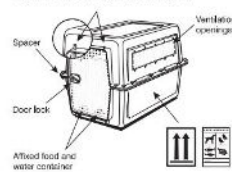
Containers made entirely of welded mesh or any other type of wire mesh are not suitable must not be used for air transport.

Plastic, rigid plastic containers are suitable for most breeds of dogs but their acceptability is at the discretion of the operator. Some rigid plastic containers may not be suitable for large dogs, or dogs that are aggressive. Example of a rigid plastic container and an example of a wooden container:

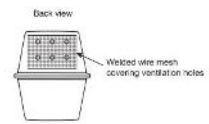
Container Requirements

TYPICAL RIGID PLASTIC CONTAINER

Locking pins must engage the container beyond the extrusions by at least 1.6 cm (¾ in)



Figure



Size (Mandatory performance requirements when selecting a shipping container)

Each animal in the container must have enough space to stand, to sit erect, to lie in a natural position and to turn about normally while standing.

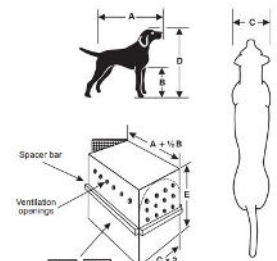
Guidance on Calculating Minimum Container Dimensions

To assist in determining the approximate size of the travelling container, the following formula may be useful. However, it may need to be adjusted to meet the mandatory performance requirements listed previously. When calculating the minimum internal height of the container, the height of bedding should be added to the height of the animal.

Animal measurements:

- A = length of animal from tip of nose to base/root of tail.
- B = height from ground to elbow joint.
- C = width across shoulders or widest point (whichever is greater).
- D = height of animal in natural standing position from top of the head or the ear tip to the floor (whichever is higher).

Note: Measurements A, B, C and D for determining the container dimensions must relate to the largest animal.



The calculated dimensions are internal container dimensions.

Minimum internal container dimensions for a single animal:

Container length = $A + \frac{1}{2} B$

Container width = $C \times 2$

Container height $E = D + \text{bedding}$

Snub-nosed breeds require 10% larger container.

Note:

Container width calculation for multiple animals:

- Two animals: $C \times 3$
- Three animals: $C \times 4$

The height and length are determined the same as for a single animal.

Crating animals together:

Weaned puppies or kittens may travel well together in the same primary enclosure. When crating puppies or kittens together in the same container/primary enclosure they must be from the same litter, not older than six months, weigh no more than 14 kg each and no more than three per container. Certain national regulations require cats or dogs to be crated individually unless the consignment is a litter over 8 weeks and travelling with the mother.

A maximum of two adult animals of comparable size up to 14 kg each, that are compatible in size and used to cota-bling, may be shipped in the same container/primary enclosure. Animals over 14 kg must be crated individually.

Sides

Side walls must be solid with sufficient ventilation as prescribed.

Plastic containers: Where containers are assembled from a top and bottom part, these must be securely bolted together. Plastic clips must not be the only fasteners holding the top and bottom part together. The use of metal nuts and bolts in every hole is recommended.

Wooden containers: For containers made of wood, or plywood, the minimum thickness of the sides is 12 mm (½ in) for dogs and 6 mm (¼ in) for cats.

Floor

The floor must be solid and leak-proof.

Roof

The roof must be solid, but ventilation holes and welded wire mesh are allowed over the whole surface provided that they do not reduce the integrity of the container and the strength of the roof itself.

Wooden containers: For containers made of wood or plywood, the minimum thickness of the roof must be 12 mm (½ in) for both dogs and cats.

Door

The door must be constructed of plastic, wood, plywood, welded or cast metal of sufficient thickness so as to preclude the animal from bending or distorting the door.

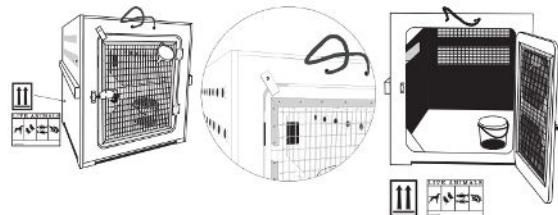
The door must form the whole of one end of the container. It can be either sliding or hinged.

For all containers using doors with locking pins, the pins must engage the container by at least 1.6 cm (5/8 in). The shipper must ensure that all hardware and fasteners are in place and serviceable.

Plastic containers: Doors made of plastic are permitted, provided that hinges and locking pins are made of metal of sufficient thickness.

When rigid plastic containers are used the door should be further secured by application of additional removable fasteners such as cable ties in the four corners of the door frame. Care must be taken when selecting the fasteners to ensure these will not cause injury to the animal or to the handling personnel.

There must be an adequate means of fastening and sealing for containers travelling to countries where sealing is required.



Container Requirements

Ventilation

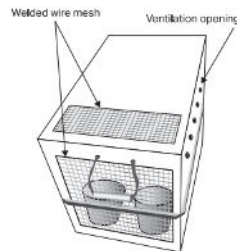
The total ventilated area must be at least 16% of the total surface of the four sides. The provision of additional ventilation openings on the roof or sides of the container or larger ventilation openings covered in welded wire mesh in order to increase the ventilation are permitted.

Ventilation must be provided on all 4 sides of the container. Ventilation openings on the sides and the back must be placed over the upper two thirds of the container.

△ The whole of one end of the container (which can be the door) must be ventilated.

The welded wire mesh insert covering ventilation openings must be securely fixed to the container so that the animal cannot dislodge it.

△ All openings must be nose and paw-proof, in the case of cats and small dogs these may have to be covered with a second layer of welded wire mesh. Where a second layer of welded wire mesh is required to make the container nose and paw proof both layers of mesh must meet the minimum standards prescribed for the species. It is very important that no animal has any surface or edge at which it can gnaw or scratch.



Wood/Plywood Containers

Where ventilation is provided by welded wire mesh it must fully overlap the frame. It must be attached to the outside of the frame using staples at least 19 mm (¾ in) long and at intervals of no more than 25 mm (1 in). In addition, for dog containers made of wood/plywood, a wood/plywood frame or strips of wood/plywood must be

placed over the edges of the welded wire mesh and affixed with screws. This compresses the welded wire mesh between the strips of wood/plywood and the outer surface of the container. The wood/plywood compression strips/frame must be at least 12 mm thick and of a placement to adequately secure the wire. Fasteners must not penetrate into the container.

Spacer Bars

Must be provided along both long sides of the container. A spacer bar must also be provided along the back of the container.

△ Spacer devices must be positioned to prevent other freight from blocking the ventilation.

Handles

Appropriate handles must be provided. Spacer bars where suitable may be considered as the handles. Handles must provide the handlers a means to move the container without a risk of being scratched or bitten by the animal.

Forklift Spacers

Must be provided for all containers where the total weight with the animal exceeds 60 kg (132 lb) and must be a minimum 5 cm (2 in) in height.

Bedding

△ Absorbent bedding that is suitable for the species must be provided.

SPF Containers

Specific Pathogen Free (SPF) dogs and cats must be transported in containers that conform to the requirements published in this Container Requirement. A "Laboratory Animals" label must be affixed to the container and "This Way Up" labels must be placed on at least two opposite sides. Filter containers for SPF consignments have special gauge air filters fixed in the ventilation apertures. Ventilation must be a minimum of 16% of the surface area of the four sides. Sufficient water must be provided for the journey. Food must be provided, if required, at the point of origin in order that the sealed container is not opened during transport. A viewing panel must be provided on SPF containers.

Labelling

A green "Live Animals" label/tag or a red "Laboratory Animals" label/tag is mandatory on all live animal consignments. "This Way Up" labels/tags are also mandatory and must be placed on at least two opposite sides. The label or tag can be imprinted on the container.