

## Introduction

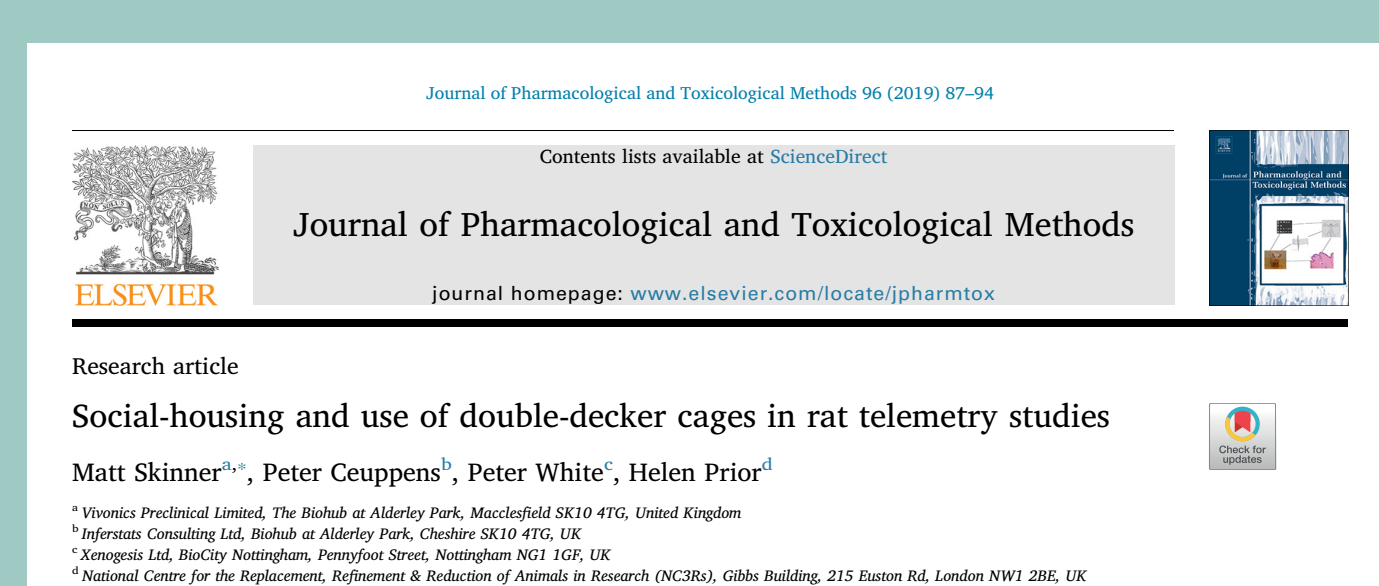
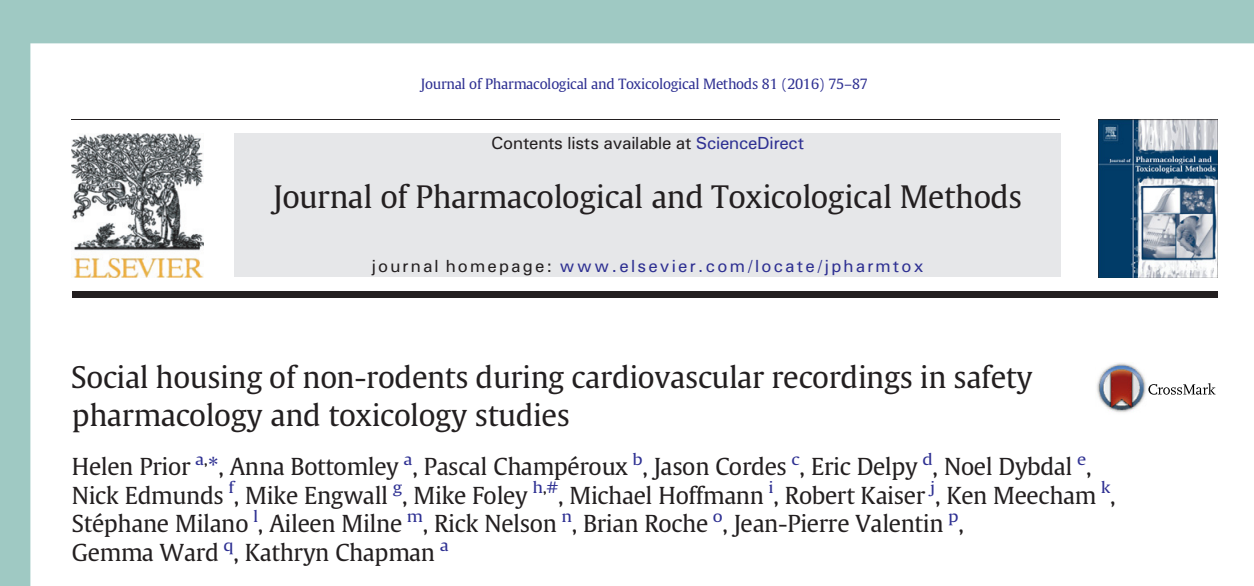
Telemetry can be used to remotely measure the physiological parameters of animals in their home environment without disturbance. Telemetered rodents (guinea pigs, rats or mice) are often used as research models or for early drug screening, whilst non-rodents (dogs, minipigs or non-human primates [NHPs]) are required for cardiovascular safety studies of potential new medicines before human clinical trials.

International animal welfare laws require that social species should be housed in stable, compatible pairs or groups, i.e. social housing. However, animals in telemetry studies are often individually-housed during recording periods due to technology limitations, cage/pen size or perceptions around data quality and risk of cross-contamination. Despite these challenges, many laboratories have successfully adopted social housing throughout telemetry studies by using companion animals or upgrading to technologies that transmit on different frequencies, so recordings can be taken from multiple animals simultaneously.

## Methods and outputs

The NC3Rs has collaborated with the Safety Pharmacology Society (SPS) since 2015 to share experiences from organisations running telemetry studies in socially-housed animals and encourage wider adoption of this refinement.

The figure below outlines how data have been collected for this project, as well as how we have disseminated its outputs.



## Results

According to our surveys, more facilities socially-housed their dogs and minipigs in 2017 than 2015 for acclimatisation and non-recording days within telemetry studies (Table 1a). A slight decrease in social housing of NHPs in 2017 was due to 4 new respondents (from the USA and Japan) who individually-housed their NHPs at all times.

Although there was a small increase in social housing of non-rodents during telemetry recordings between 2015 and 2017, many facilities still separated their animals during these periods (Table 1b).

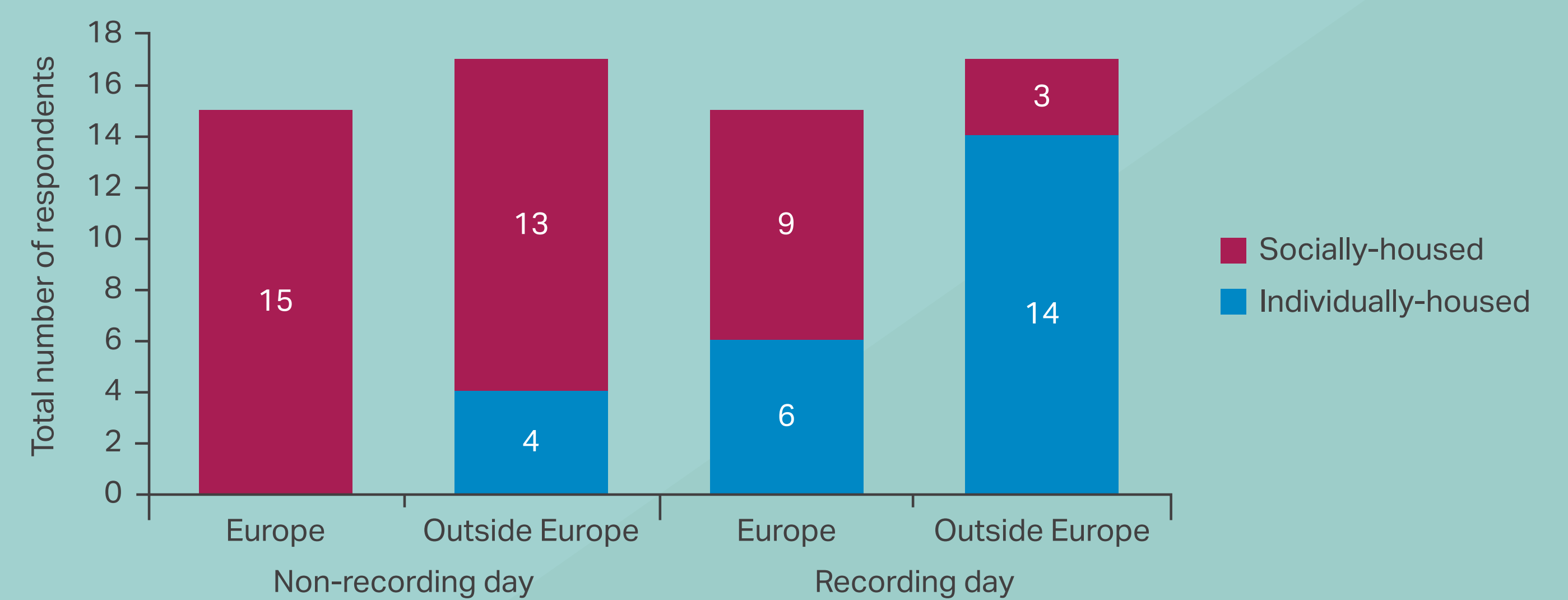
	Dog	Minipig	NHP
2015	84% (n=25)	67% (n=15)	100% (n=24)
2017	88% (n=32)	81 (n=16)	87% (n=30)

**Table 1a.** Percentage of facilities socially-housing non-rodents on non-telemetry days.

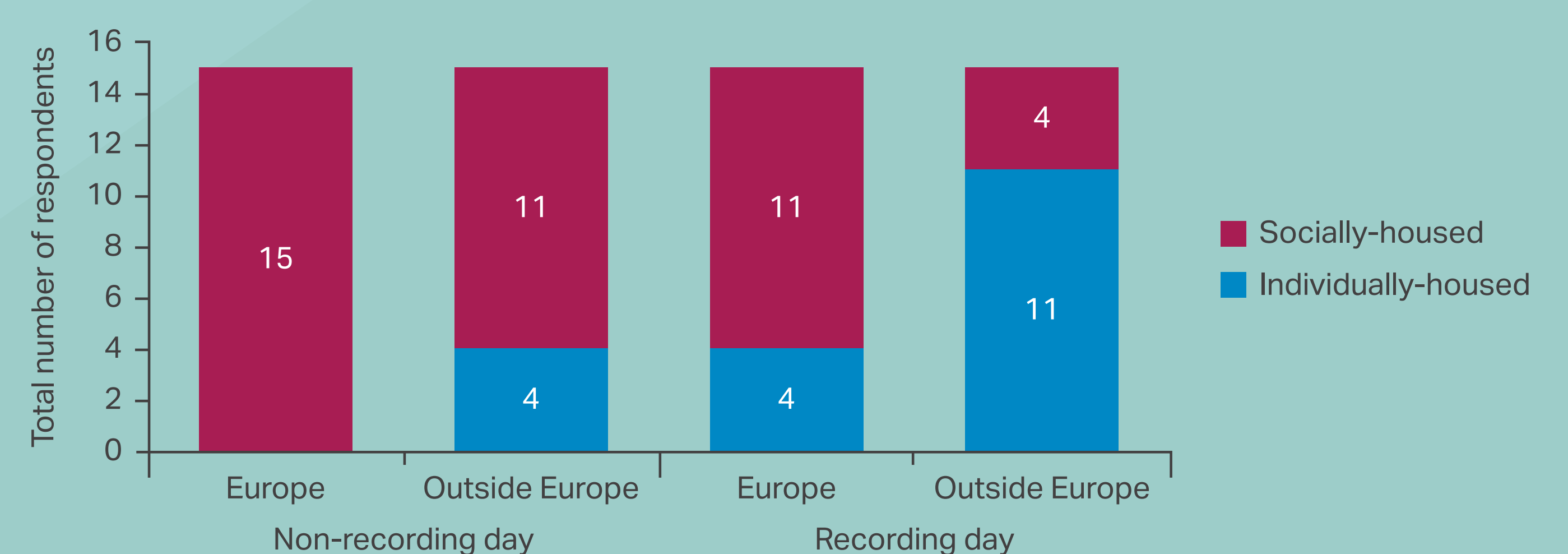
	Dog	Minipig	NHP
2015	20% (n=25)	20% (n=15)	33% (n=24)
2017	38% (n=32)	44% (n=16)	50% (n=30)

**Table 1b.** Percentage of facilities socially-housing non-rodents during telemetry recordings.

The 2017 data were stratified by responses from within and outside Europe (USA, Canada and Japan). This indicated that the facilities individually-housing non-rodents were largely based outside Europe (see Figures 1a and 1b; minipig data not shown).



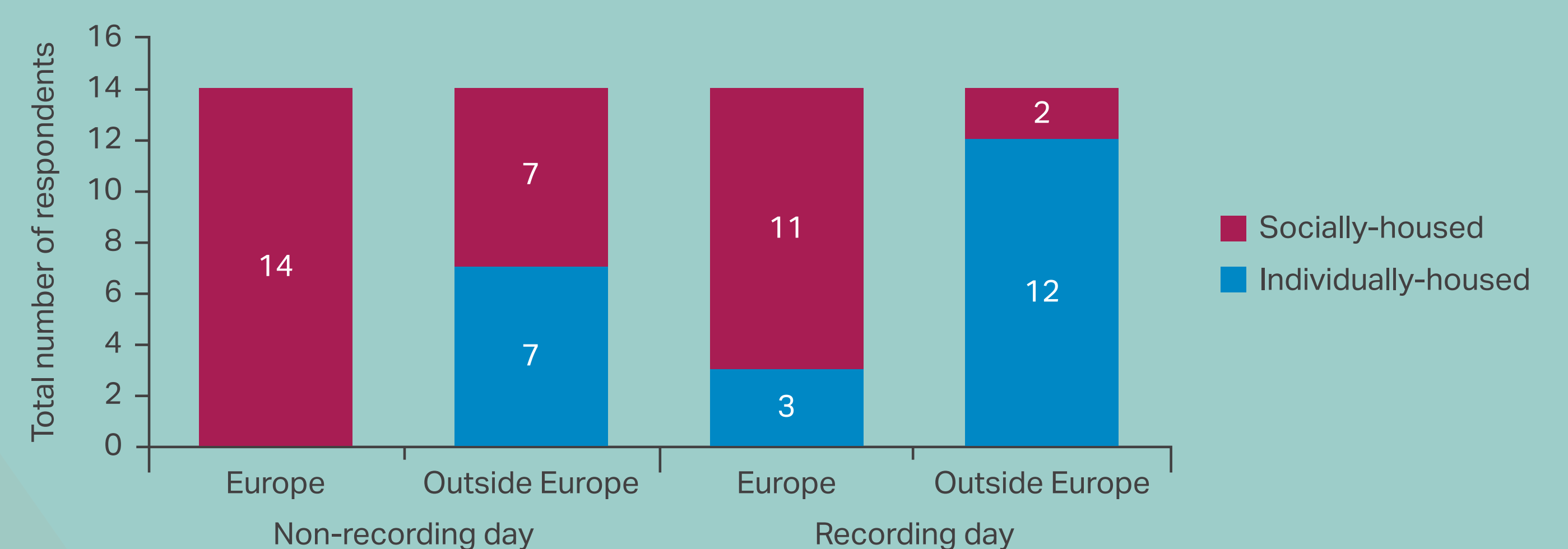
**Figure 1a.** Number of facilities reporting each housing condition for dogs in the 2017 survey.



**Figure 1b.** Number of facilities reporting each housing condition for NHPs in the 2017 survey.

Respondents with experience of social housing during telemetry studies reported similar financial costs compared to studies using individually-housed non-rodents. Socially-housed animals exhibited fewer stress behaviours and more normal behaviours – for example, settling quicker after dosing and playing with pen-mates. Data from socially-housed animals were the same or better quality than from individually-housed animals and were considered acceptable by regulators.

The first set of rat data from 2017 (Figure 2) indicated that 79% of respondents from Europe socially-housed their rats during telemetry recordings by using an unrecorded companion (57%) or recording multiple rats in the cage (21%). However, only 14% of respondents from outside Europe socially-housed their rats during the telemetry recording periods, all by using an unrecorded companion.



**Figure 2.** Number of facilities reporting each housing condition for rats in the 2017 survey.

The 2015 survey identified the following barriers to the adoption of social housing:

- 1) Recording equipment is not compatible for multiple animals.
- 2) Pens/cages are too small for multiple animals.
- 3) Perceptions on data quality (variability) from multiple animals.
- 4) Perceptions of cross-contamination risk.

The 2017 survey found the same barriers still exist, meaning that more work must be done to challenge misconceptions about social housing and encourage implementation.

## Conclusions

Social housing during telemetry recordings is applicable to any species and telemetry purpose within industry or academia. Many facilities, particularly those outside Europe, require financial investment to upgrade telemetry hardware, infrastructure and/or housing so animals can be socially-housed. Facilities already implementing social housing during telemetry recordings should share experiences, best practice and validation data to promote the uptake of this refinement.

## 3Rs impact

This work could potentially refine the housing conditions of thousands of animals during telemetry recordings within academia and industry worldwide.