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### Summary

### Zusammenfassung



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## Bird markets – An assessment of the situation in Germany with special reference to animal welfare aspects

### *Vogelbörsen – Eine Bewertung der Situation in Deutschland unter besonderer Berücksichtigung von Tierschutzaspekten*

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Bird markets have a long tradition in Germany. They still play an important role for private pet bird keepers and breeders in the purchase and exchange of all types of pet birds. However, such events can result in stress for the animals on offer. Manual capture out of the usual husbandry environment, transportation to the bird market, housing in spatially confined sales cages, presentation in unfamiliar surroundings and also the effect of environmental stimuli through market visitors or any type of animals (irrespective if these are conspecifics or members of foreign species, in particular potential predators) must be categorized as potential stress factors.

The presented review article summarizes results of an assessment of bird markets throughout Germany with regard to animal welfare aspects as part of the Exo-pet I study, funded by the Federal Ministry of Food and Agriculture (BMEL) via the Federal Agency for Agriculture and Food.

Pros and Cons of bird markets are discussed. Shortcomings relevant to animal welfare were observed at all inspected bird markets. Observed deficiencies could be traced back predominantly to an inadequate problem awareness by the vendors, together with a lack of expertise and inadequate monitoring by the bird market organizers. Therefore, comprehensive monitoring of markets via professionally qualified supervisors must be regarded as a basic prerequisite for animal welfare-compliant organization of markets. Any deficiencies identified must be consistently punished and immediately remedied, not least as an educational measure. Furthermore, supervision by the authority responsible for animal welfare must be guaranteed through, among other aspects, appropriate risk-oriented on-site monitoring.

**Keywords:** animal welfare, aviculture, bird market, monitoring, pet bird

Vogelmärkte haben in Deutschland eine lange Tradition. Sie spielen beim Kauf und Tausch von Ziervögeln aller Art für private Ziervogelhalter und Züchter nach wie vor eine wichtige Rolle. Allerdings können solche Veranstaltungen zu Stress für die angebotenen Tiere führen. Das Herausfangen aus der gewohnten Haltungsumwelt, der Transport zum Vogelmarkt, die Unterbringung in räumlich begrenzten Verkaufskäfigen, die Präsentation in ungewohnter Umgebung und auch die Einwirkung von Umweltreizen durch Marktbesucher oder Tiere jeglicher Art (unabhängig davon, ob es sich um Artgenossen oder Angehörige fremder Arten, insbesondere potenzielle Prädatoren handelt) sind als potenzielle Stressfaktoren zu kategorisieren.

Der vorliegende Übersichtsartikel fasst Studienergebnisse, die als Teil der vom Bundesministerium für Ernährung und Landwirtschaft (BMEL) über die Bundesan-

stalt für Landwirtschaft und Ernährung geförderten Exopet-I-Studie auf deutschen Vogelmärkten im Hinblick auf Tierschutzaspekte dokumentiert wurden, zusammen.

Vor- und Nachteile von Vogelmärkten werden diskutiert. Bei allen untersuchten Vogelmärkten wurden tierschutzrelevante Mängel festgestellt. Die beobachteten Defizite waren überwiegend auf ein unzureichendes Problembewusstsein der Verkäufer, verbunden mit mangelnder Sachkunde und unzureichender Überwachung durch die Veranstalter der Vogelbörsen zurückzuführen. Eine umfassende Überwachung des Marktgeschehens durch fachlich qualifiziertes Aufsichtspersonal ist daher als Grundvoraussetzung für eine tierschutzkonforme Gestaltung von Vogelmärkten anzusehen. Erkannte Defizite müssen konsequent geahndet und sofort abgestellt werden, nicht zuletzt aus erzieherischen Gründen. Darüber hinaus muss eine Überwachung durch die für den Tierschutz zuständige Behörde unter anderem im Rahmen einer risikoorientierten Vor-Ort-Kontrolle gewährleistet werden.

**Schlüsselwörter:** Tierschutz, Vogelzucht, Vogelbörse, Überwachung, Ziervogel

## Introduction

The EU ban on the import of live birds other than poultry as defined in Article 1 of Commission Decision (2000) which has been in place since 2005 has led to a drastic reduction in the range of species and the number of imported aviary birds (Commission Decision 2005, Reino et al. 2017). As a result, the spectrum of bird species offered in pet shops has also reduced considerably and is currently restricted mainly to a few domesticated species. Among the order Psittaciformes, the offer is dominated in particular by Budgerigars (*Melopsittacus undulatus* f. dom.), Cockatiels (*Nymphicus hollandicus* f. dom.), Red-crowned Parakeets (*Cyanoramphus novaeseelandiae*) and various Lovebirds of the Genus *Agapornis* or Bourke's Parrots (*Neopsephotus bourkii*) as well as different species of the Genus *Neophema*. Among passerine birds, Canaries (*Serinus canaria* f. dom.), Zebra Finches (*Taeniopygia guttata* f. dom.), Bengalese Finches (*Lonchura striata* f. dom.) and Gouldian Finches (*Chloebia gouldiae*) are mainly represented in the product range. For the purchase of other species in demand by bird fanciers in Germany, the trade at bird markets and animal markets – alongside specialized stores and websites – plays a central role. This includes, besides numerous other species of psittaciform and passeriform birds, in particular various representatives of gallinaceous and columbiform bird orders. A comprehensive overview of the wide range of bird species kept by bird fanciers is given by Holland (2007).

Commercial and non-commercial trade in animals always requires consideration from animal welfare aspects. However, it seems that scientifically proven findings on keeping conditions and care measures which are subject to public criticism, in particular as part of bird markets, have been absent until now. Subsequently, a current overview of shortcomings relevant to animal welfare, found as part of inspections at bird markets, shall be provided. Part of the assessments were carried out within the study „The private keeping of exotic and wild animals: Situational analysis, evaluation and possible need for action concerning especially animal welfare aspects“ (Exopet 2018). In the process, focus was placed on the minimum requirements to be fulfilled with regard

to presentation, accommodation and care of aviary birds at bird markets for the humane implementation of a bird market.

## Animals, Material and Methods

Based on information published on the internet and details provided by the competent authorities in Germany, 17 planned and approved animal markets were randomly drawn. For uniform assessment, multi-page ‘stock exchange checklists’ were developed on the basis of the mentioned guidelines for animal markets of the BMEL (2006). At each bird market, ten vendors were randomly selected for a detailed examination of their birds on sale and their respective husbandry conditions. As an exemption, in one small market, only three vendors presented their birds – all three were examined in this case. Each of the markets was assessed by two scientists (biologists and/or veterinarians) with expertise in avian care and husbandry. After each visit to the animal market, an extensive individual protocol was written, e.g. partly with an image attachment and an objective description of the event, which clearly reflected the overall impression of the individual animal markets (for a detailed description of the methodology, see Exopet 2018).

For data acquisition, a standardized protocol was designed, which was used to record parameters for the situation when announcing the pet bird market in print media or on the internet, the situation during the bird market and the situation with the vendor (Exopet 2017). English and scientific names of bird species referred to in the article follow the IOC World Bird List (Gill et al. 2021).

## Results

From the 17 bird markets examined, eight were organized by a local breeder organization, two by a breeder organization active throughout Germany, two by the respective town of the venues, and five markets by

**TABLE 1:** Situation at the public announcing of the bird market

Criterion		[n]
organization of the bird market	exclusively sale of live animals	15
	flea market with sale of live animals	2
organizer of the bird market	private	12
	professional	5
spatial conditions of the bird market	indoor	13
	outdoor	3
	indoor and outdoor	1
duration of the bird market	one-day	16
	several days	1
offered species on the market	only birds	11
	birds and other vertebrates	6
obligatory pre-registration of vendors	yes	7
	no	10
reference to BMEL regulations during pre-registration of vendors	yes	13
	no	4
reasons leading to exclusion of vendors from the bird market	listed and available	13
	not available	4

a commercial organization (Table 1). No recognizable wild birds were offered on the bird markets visited. The club-linked events apparently served almost exclusively to sell their own offspring and to acquire new breeding animals. No commercial dealers could be clearly identified on the selected bird markets. On those markets with a commercial background, the promoter focused more on the sale of feed and accessories. In two cases the bird market was combined with a flea market on which typical flea market items such as second-hand clothes, antiques, art, pottery, etc. were offered. An additional bird exhibition was combined with the market in one case. Duration of the markets was 3–6 hours in most cases on a single day, only in one case the market lasted several days.

In total, 163 vendors were examined more closely. In many cases it was not even possible to identify individual vendors at first glance, as sales cages were often so close on presentation tables that only the details on the declaration plates enabled an assignment of the birds on offer to individual market participants. Oftentimes only one or two species were offered by one vendor, rarely more than four. Numerous data were gained within the study (Exopet 2018), however, due to the huge differences between the individual vendors examined no statistical analysis could be performed, nor would it have been scientifically based to give absolute numbers (e.g. on the hours of sunlight the birds had been exposed). Therefore, an overall impression is given in the following text.

**Type of market premises**

In eleven bird markets, only birds were presented, in four other markets additional mammals and in two cases pet mammals and ornamental fish were sold as well. Three of those animal mixed markets were situated outdoors, another three markets were indoor but with no option for air-conditioning (heating/cooling).

With outdoor events, the overall impression of the market often recorded a total lack of or insufficient protection from weather conditions for the birds on display. In particular sunshades, which are often set up as pro-

tection from direct solar radiation, cannot continuously fulfil their function at immobile market stalls because of the changing position of the sun in the course of a day, which is why the birds on offer were partially exposed to direct sunlight for hours without protection (Fig. 1).

Distance apparatuses, which should guarantee a minimum distance between the birds on offer and the market visitors, are a necessity for minimization of stress for the birds, but were rarely present in an efficient manner. Installation of a second line of tables in front of those carrying the sales cages (Fig. 2) were classified as an effective distancing measure. In this way – as opposed to the installation of easily moveable barricade tape („barrier tape“) or cordons – a stable boundary to the birds was created even in the event of jostling in the visitor aisle, and at the same time an unintentional dislodging and the resulting overturning of cages, which were often set up in several rows, was effectively precluded.

**Overall impression of the accommodation of birds**

Transportation usually means great stress for aviary birds and therefore must be carried out as carefully as possible by using suitable containers. In order to avoid damage



Photo: Norbert Kummerfeld.

**FIGURE 1:** Display of aviary birds as part of an outdoor animal market. Insufficient protection against weather conditions, in particular solar radiation.



Photo: Jörg Ehtenbröcker.

**FIGURE 2:** Sales shelf with a two-row arrangement of sales cages, in which birds native to Germany, including finches such as European Greenfinches (*Chloris chloris*), as well as frugivorous and insectivorous species („soft-bills“) such as Common Blackbirds (*Turdus merula*) are offered for sale. A line of tables in front of the sales shelf ensures a minimum distance between the market visitors and the birds.



and stress through the capture and moving into the container, it is most practical to use the sales container for transportation and hand it over to the buyer. In light of this, the conception of single-use bird cages (Fig. 3), meeting the minimum requirements with regard to size and equipment (see below), for transportation, display and sale of birds at pet bird markets, is viewed as a humane and hygienic alternative to the usual transportation and sales containers.

Shortcomings relevant to animal welfare on the visited bird markets were most frequently determined in the delivery and the accommodation of birds during the course of the market. Therefore, they fall within the competence of the vendors of the animals. Many shortcomings were observed at pet bird markets and animal markets during the delivery of birds, in particular doves, gallinaceous birds, ducks, and geese into the market rooms. Carrier boxes densely occupied with birds were not delivered horizontally on trolleys, but instead stacked on top of each other and tilted at a ca. 90° angle on two-wheeler dollies via non-paved paths. The result was that animals slid on top of each other, and were tightly crowded in the lower areas of the transport containers.



Photo: Thomas Bartels.

**FIGURE 3:** Single-use bird cage made from corrugated cardboard. The cage has the following internal dimensions: length: 35 cm, width: 17.5 cm, height: 29 cm. Two spring-mounted perches can be attached to the cage grill from outside.



Photo: Bernd Lankamp.

**FIGURE 4:** Japanese Quails of different colour variations, crammed in tightly without access to feed and water in a box cage which is only observable and accessible from above.

The keeping conditions of the presented birds with regard to cage size, condition and equipment, cage hygiene, feed and water supply often did not comply with the minimum requirements demanded for animal welfare. Unsuitable cages, in many cases consisting of wire mesh on all sides, overcrowding and hygiene deficiencies were detected in particular in the vendors of „low priced“ aviary birds such as Zebra Finches and Bengalese Finches. Cages in which Canaries, Budgerigars, various species of Lovebirds as well as King Quails and doves were offered showed similar conditions. Furthermore box-like containers, in which, for example, Japanese Quails (*Coturnix japonica* f. dom.) were presented, were often massively overcrowded. These sales containers in which the animals had also been transported to the market either were closed at the sides with a wired top or were solely made of wire grill, and frequently, animals were without feed and water supply. Typical examples of overcrowded cages and deficits with regard to hygiene and care seen in our examinations are shown in Figures 4 and 5.

Acceptable sales containers for aviary birds were „box cages“ in a design also used for bird exhibitions, which are closed on all sides apart from a front wire grid, equipped with perches, a drinker and suitable feed (Fig. 6). The wired front in these cages is ensured not to have any sharp ridges that could potentially cause injury. Single-use bird cages made from sturdy cardboard were also seen (Fig. 3).

Among the vendors of estrildid finches, finches native to the region and doves, cages sometimes were covered with natural or artificial foliage as a screen, which seemed to have a positive effect on the birds' behaviour (Fig. 7).

### Supervision and monitoring of pet bird markets

Neither exhibitor directories nor details of the species offered were publicly available in advance from any of the visited bird markets. In some cases, the names of the dealers who sold accessories or feed were disclosed beforehand. The bird markets assessed were hosted either by associations or commercial organizers, and the information details provided differed only marginally in either case. The aforementioned BMEL (2006) guidelines demonstrate in particular which monitoring tasks are incumbent on those responsible for the markets.

A pre-registration of the vendors was however asked for in seven of the 17 markets. In eight of 17 market events, entry check-up took place neither for animals nor for sales containers brought in by the person responsible for the stock exchange or deployed staff, which was especially true for events not related to any association.

In 13 markets, a reference to the BMEL market organization guidelines was available for participants, exclusion criteria were defined in 13 cases and in ten markets, BMEL regulations were posted in the entrance area (Tables 1 and 2).

It cannot be assessed whether the organizer had inspected the incoming sales containers, as access for visitors to all fairs was only possible during normal visiting hours, while vendors could visit the premises beforehand. There was no label on the containers indicating inspection and/or approval by the exchange manager. In seven markets, however, there was an inspection at the entrance where ordinary staff was present.

Photo: Bernd Lankamp



**FIGURE 5:** Overcrowded sales cages with Canaries of different colour variations.

Photo: Jörg Ehlenbröker



**FIGURE 6:** Typical exhibition cage with the dimensions: length: 34 cm, width: 16 cm, height: 29 cm, occupied by two Canaries.

Photo: Jörg Ehlenbröker



**FIGURE 7:** European Goldfinch (*Carduelis carduelis*) in a sales cage. The front grill is covered with a conifer twig serving as a screen.

It could not be observed that security staff checked the vendors, nor could a veterinarian in charge be seen. The present staff rather seemed responsible for coordinating the visitors.

### **Discussion and recommendations**

According to Article 4 of the European Convention for the Protection of Pet Animals (1987), any person who keeps a pet animal or who is looking after it is responsible for their health and well-being.

Furthermore, according to Article 9 of the European Convention for the Protection of Pet Animals (1987), pet animals shall not be used in advertising, entertainment,

exhibitions, competitions and similar events unless the organizer has created appropriate conditions for the pet animals to be treated in accordance with the requirements of Article 4, paragraph 2, and the pet animals' health and welfare are not put at risk. These internationally agreed regulations must be applied correspondingly to animals offered at livestock and animal markets.

The German Animal Welfare Act (TierSchG 2006) contains further regulations for the implementation of animal markets. The approval procedure is specified in the general administrative regulation for the implementation of the German Animal Welfare Act (AVV 2000). Among other aspects, the person responsible for the implementation of an animal market must provide evidence of the relevant knowledge and abilities and the necessary



**TABLE 2:** *Situation during the bird market*

Criterion		[n]
posting of BMEL regulations in the entrance area	yes	10
	no	7
presence of declared supervisory staff	yes	7
	no	10
inbound inspection of sales cages by supervisory staff	yes	9
	questionable	8
presence of walk-in aviaries for transfer of sold birds	yes	13
	no	4
possibility of temporary placement of already sold birds	yes	1
	no	16

reliability for the activity. Suitable rooms and equipment provided for the activity, which meet the requirements laid down in the German Animal Welfare Act, must be shown during an inspection. Animal markets are subject to supervision by the authorities responsible for animal welfare. Furthermore, animal markets are characterized by animals being offered for sale or exchanged by private individuals only.

The conditions in which animal markets are implemented, such as the occasionally considerable influx of visitors, the large number of animals on offer foreign to each other and the frequently wide spectrum of species, can lead to considerable stress for the animals. For this reason, the German Federal Ministry of Food and Agriculture (BMEL) responsible for animal welfare created the „Guidelines for the organization of animal markets with reference to animal welfare aspects“ (BMEL 2006) for clarification of the general provisions of the German Animal Welfare Act. These animal market guidelines contain, inter alia, recommendations on preparation and implementation of pet bird markets and transportation of animals to the market, as well as on minimum requirements for keeping conditions, which must be guaranteed for the duration of the market. They serve to provide guidance and interpretation in the application of relevant legal requirements. The aim of the guidelines on the one hand is to provide a policy for the authorities regarding assessment of animal welfare in permit procedure and monitoring, which is comprehensive across the federal states. On the other hand, these guidelines are to convey the necessary information with regard to animal welfare for the organization and implementation of an animal market or participation in an animal market to organizers of animal markets, those responsible for markets, to supervisors, vendors and visitors in a nationally uniform manner. Through these guidelines, authorities gain a broader scientific basis for specification of their stipulations. Although the guidelines are not legal norms and are therefore not legally binding, they do have a certain degree of obligation for the actions carried out by the authorities. However, they do not limit the legitimacy of what is allowed according to national or community law, and, from a specialist point of view, there is still a need for correction on some aspects with regard to the parameters listed for the humane implementation of pet bird markets.

Pet bird markets continue to play a major role for private bird owners and breeders in the purchase and exchange of all types of aviary birds. In principle, the breeding of birds in human care offers the potential to reduce the pressure on wild populations through legal and in particular illegal capture in the wild, often associ-

ated with long-distance transportation, as the demand for certain bird species can be covered through controlled breeding (Snyder et al. 2000, Peng and Broom 2021). It is an essential component of a species- and behaviourally appropriate aviculture to give birds the possibility to engage in courtship and mating, to hatch eggs and raise offspring. As the German Animal Welfare Act forbids the killing of vertebrate animals without reasonable cause, for example surplus offspring may not be culled by the animal owner or euthanized by a veterinary surgeon. Bird breeders benefit from bird markets as a platform for the selling of surplus young birds. Responsible and expert vendors at pet bird markets can furthermore exert a positive influence on the keeping quality of animal owners. In addition, bird markets – representing a subsection of pet animal keeping – also have a social significance for bird lovers and contribute indirectly to the fostering of social activities between like-minded people (Kidd and Kidd 1998, McNicholas et al. 2005). Offering aviary birds at animal markets does not inevitably have to be negative from an animal welfare aspect, as many positive examples have demonstrated. For example, single-use bird cages provide the opportunity to be used as combined transportation and sales containers as part of pet bird markets. Single-use cages seemed advantageous from a hygienic as well as an animal welfare point of view, as the additional stress caused by capture of birds out of sales cages is omitted. At each inspected pet bird market, there were also vendors who clearly followed the guidelines of the German Federal Ministry of Food and Agriculture (BMEL 2006) for animal markets with regard to cage sizes and stocking density, even beyond stipulated market rules.

However, compromises on the welfare of the animals presented at bird markets must be reduced to an unavoidable minimum. Apart from regulations, traders must understand the existing problems to achieve an improvement. The fairs were examined anonymously. However, the study would have benefitted from including interviews of the traders looking at their motivations.

For an assessment of the welfare of animals, the rules of the „European Convention for the Protection of Animals kept for Farming Purposes“ (1976) („Five Freedoms Concept“) may be taken as a basis. These aspects are not only limited to livestock, but can be applied unreservedly to pets (Schuppli and Fraser 2000, Engebretson 2006). Protection from pain, suffering, fear, injury and disease, representing some of the Five Freedoms, are main topics in the offering and selling of birds as pets (Warwick et al. 2018). Accordingly, this concept is equally suitable in the assessment of the welfare of aviary birds at bird markets.

A humane implementation of aviary bird markets from a specialist point of view is solely guaranteed in closed rooms, which – if required – can also be air-conditioned. Only in this way, sufficient protection from weather conditions can be guaranteed. In reality the offer of aviary birds and poultry was not only limited to specific (exotic) pet bird markets, but also took place as part of animal markets where agricultural livestock and many other pet animals were simultaneously offered for sale. Our study demonstrates that self-monitoring by the market organizer in particular, but also effective monitoring by an official veterinary surgeon did not take place with the necessary thoroughness. Similar observations at pet animal markets in Germany are also described by Bläske et al. (2019) and Moll et al. (2019). Blatant shortcomings

in animal accommodation and animal care – which are also recognizable by laypersons – as overcrowded or dirty cages, lack of drinking water etc. – can and must be stopped by committed action on the part of market organizers or monitoring personnel responsible for implementation of market rules, ideally both upon entry to the market and during on-site inspection. Independent of self-monitoring, the authority responsible for animal welfare must assure supervision through suitable on-site monitoring. The increased probability of the occurrence of circumstances relevant to animal welfare in the course of these events requires close monitoring. Discovered shortcomings must be remedied and punished; if necessary, the issued permit should be revoked. Compliance with animal health requirements and requirements for cleanliness and practicality of the sales cages is not only important from an animal welfare point of view, but is also indispensable for hygiene management (Boseret et al. 2013). Pet birds infected with zoonotic pathogens such as *Chlamydia psittaci* or *Salmonella* can contaminate their environment, for example by excreting the pathogens in their faeces or via feather dust (Koene et al. 2007, Miskiewicz et al. 2018, Drózdź et al. 2021). In birds, an increased excretion of pathogens could be proven in stress situations (Smith et al. 2005). In this respect, the lowest possible stress level at bird fairs should be aimed for, not only from an animal welfare point of view, but also for reasons of disease control (Koene et al. 2007, Drózdź et al. 2021). It is also worth mentioning that, in contrast to a study on reptile markets (Moll et al. 2019), neither exhibitor directories nor details of the species offered were publicly available in advance from any of the visited bird markets. However, from an animal welfare and species conservation point of view as well as an epidemiological hygiene perspective, such information is considered helpful for the follow-up of violations. The aforementioned BMEL (2006) guidelines demonstrate in particular which monitoring tasks are incumbent on those responsible for the markets.

Shortcomings were observed at all inspected bird markets, the causes of which in the majority of cases can be attributed to three factors, namely

1. an inadequate problem awareness by the vendors in combination with disregard of market rules (provided these existed *and* had been made available to the potential vendors in advance),
2. a lack of expertise and an absence of or inadequate monitoring by the market organizer and/or the attendants employed or lack of sanctioning of vendors in the event of obvious shortcomings in the accommodation and/or care of the birds offered and
3. an often insufficient on-site monitoring and – in the event of discovered shortcomings – insufficient remedy of defects and sanctioning by the authorities responsible for animal welfare supervision of the pet bird market.

## **Conclusions**

The strict observance of animal-friendly keeping and accommodation conditions by the vendors and their monitoring by the market organizer are a fundamental prerequisite for the implementation of animal welfare-compliant pet bird markets (Moritz 2000, 2007). It seems advisable not to limit the monitoring of pet bird markets

to random checks in a limited period, but instead to guarantee surveillance over the entire duration of the event, including transportation of the birds to and from the market. To this end, it seems expedient and necessary to draw on external expertise in the continuous monitoring, for example by veterinary surgeons specialized in bird medicine.

Animal market guidelines for authorities and organizers should become a nationally uniform and legally binding regulation. This directive should contain the mandatory minimum requirements as a set of prerequisites which must be observed for an animal welfare-compliant implementation of market events as well as executive orders for the relevant authority. However, it is no less important to raise awareness among bird breeders, who make up the majority of sellers at bird markets, for example through training measures within the breeders' associations. Protection from pain, suffering, fear, injury and disease are main topics in the offering and selling of birds as pets (Warwick et al. 2018). A catalogue of minimum standards for husbandry conditions required from the authors' point of view is added as supplementary material.

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## **Ethical approval**

The authors hereby declare that they have followed the universally accepted guidelines of good scientific practice while preparing the present paper.

## **Conflict of interest**

The authors hereby declare that they have no proprietary, professional or other personal interests in any product, service and/or company that could have influenced the contents or opinions expressed in this publication.

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## **Authors contribution**

Conception and design of the project: TB, M-EK-J.  
Data collection, analysis and interpretation: TB, KC, NK, FM-T, KP, MvR.  
Drafting of the manuscript; critical revision of the article and approval of the final draft for submission: TB, KC, MD, NK, FM-T, KP, MvR, DT, M-EK-J.

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