



Opinion on the space requirements for snakes in vivaria within pet selling establishments.

**Animal Welfare Committee
Nobel House
17 Smith Square
London
SW1P 3JR**

Animal Welfare Committee (AWC) Opinions

AWC Opinions are short reports to government¹ on contemporary topics relating to animal welfare. They are based on evidence and consultation with interested parties. They highlight particular concerns and indicate issues for further consideration by governments and others.

AWC is an expert committee of the Department for Environment, Food and Rural Affairs in England and the Devolved Administrations in Northern Ireland, Scotland and Wales. More information about the Committee is available at <https://www.gov.uk/government/groups/animal-welfare-committee-awc>

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¹ Where we refer to “government” we are addressing the Department for Environment, Food and Rural Affairs in England, the Scottish and Welsh Governments, the Northern Ireland Assembly and other responsible government Departments and Agencies.

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Introduction

1. On 1 October 2019, FAWC was renamed the Animal Welfare Committee (AWC) and its remit was expanded to include companion animals and wild animals kept by people, as well as farm animals. This enables it to provide authoritative advice to Ministers in DEFRA and the Scottish and Welsh Governments, based on scientific research and experience, on a wider range of animal welfare issues.
2. AWC gathered evidence for this Opinion through reviewing peer-reviewed and other research, consulting stakeholders and experts in the field. Key sources are footnoted. These typically refer to legislation, other AWC publications or scientific papers that review or contribute to knowledge of the point in question, but do not represent the full breadth of the evidence considered.

Scope

3. This Opinion considers the welfare of snakes housed in vivaria in licensed pet selling establishments in England.
4. The questions AWC has been asked to address are:
 - Is there any evidence, based on animal welfare, for a minimum length size for vivaria housing snakes temporarily, and if so, for which species and time periods does it apply?
 - On the same basis, is there any evidence relating to what the optimal length might be?
 - To identify which snake species are most commonly sold in the UK pet trade

Executive summary

5. The original recommendations for the size of vivaria for snakes following the passing of The Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018² were based primarily on expert opinion. Since then, a considerable amount of further research has been undertaken and continues to be undertaken, into all aspects of the keeping of snakes in captivity. Much of that evidence concentrates on the beneficial nature of the larger vivaria given that the nature of research evidence of direct harms for smaller ones are considerably more difficult to establish. Snakes remain non domesticated and as such should be considered as captive animals. Thereby any keeping conditions need to allow any species, displayed for sale or permanent household keeping, to live in conditions conducive to ensuring both short and longer-term health and welfare.
6. It is for this reason that the committee has concentrated, for the purposes of retail, on the minimum dimensions and time where there can be currently acceptable

² <https://www.legislation.gov.uk/uksi/2018/486/contents/made>

short term welfare conditions rather than on the optimum, which almost invariably will be larger, and more species dependent.

Definitions

7. Technical terms are defined in the glossary.

Background

8. Current guidance accompanying The Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018 sets out that for snakes, the length of the enclosure should be no less than two-thirds the overall length of the snake, and by comparison, for lizards, the length of the enclosure should be four times the snout to vent length of the lizard, or larger.

Legal Context

9. The legislation referred to in this Opinion may include additional amendments that are not listed here.
10. All snake keepers are legally obliged to ensure minimum standards of care for their animals under the Animal Welfare Act 2006 (“the 2006 Act”) in England. It is an offence to cause unnecessary suffering to any companion animal and all reasonable steps must be taken to ensure that the needs of animals under a keeper’s care are met. Anyone who causes an animal unnecessary suffering faces being sent to prison for up to 5 years or receiving an unlimited fine or both. Anyone who does not provide properly for its welfare needs, faces an unlimited fine or being sent to prison for up to 6 months, or both. Following a conviction for either of these offences, the court may also ban the offender from keeping animals or certain types of animals and/or order that their animals are removed from them.
11. The Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018 (“the 2018 Regulations”) set out the conditions that need to be fulfilled by a licensed pet selling establishment, such as providing the animal with a suitable environment and a suitable diet.
12. The guidance that accompanies the 2018 Regulations assists local authority inspectors, as well as licensees, when considering a pet selling establishment for a licence under the 2018 Regulations.
13. The Dangerous Wild Animals Act 1976 (“the 1976 Act”) (and subsequent amendments/modifications) regulates the keeping of certain kinds of animals listed in the schedule deemed as dangerous and for which special provision and licencing has to apply. This includes various species of snakes.
14. The UK government is a signatory to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) which is an international agreement between governments aimed at controlling the trade of specimens of wild animal and plants where there is threat to their existence.

15. The Welfare of Animals (Transport) (England) Order 2006 makes it an offence to transport any animal in a way which causes, or is likely to cause, injury or unnecessary suffering to that animal. The commercial movement of snakes is covered under Council Regulation EC No 1/2005 (as retained).

Data on reptile and snake keeping in the UK

16. The common language word 'snakes' covers a considerable range taxonomically of approximately 4,000 species within different genera and families. This is markedly different from the familiarly referenced domestic animals where the preponderance of consideration is related to a few species and breeds within the species.

17. There is limited data on snake numbers in the UK, and the sources vary in the reliability and transparency of their methodology. Two separate large-scale surveys produced comparable UK snake population estimates, albeit with substantial margins of error, based on direct surveys of owners by independent professional researchers. Several small surveys provide results consistent with those of the two large-scale surveys. The pet-reptile industry, as represented by REPTA, has produced a much higher, indirect estimate, based on reported food sales, although the methodology and assumptions used in producing their indirect estimate are unclear. Several other sources are not sufficiently informative for the overall question of common snake species numbers but do provide numbers for their specific restricted survey terms or requirements.

18. Nonetheless, all relevant data sources broadly agree regarding which are the commonest snake species sold and kept as pets in the UK. The majority of kept snakes belong to two families, *Colubridea* or *Pythonidea*. Corn snakes (*Colubridea*) and Royal pythons (*Pythonidea*) are numerically by far the two most commonly kept species. The next most kept *Colubridea* are King snakes, Milk snakes, Garter snakes and Hognose snakes, and of the *Pythonidea* are Burmese, Carpet and Reticulated pythons. Other kept snakes include Boa constrictors and, less commonly, Rainbow boas. There is then a wide variety of other species more rarely kept, including some larger snakes and some classed, under the relevant legislation, as dangerous wild animals.

19. The annual Pet Food Manufacturer's Association (PFMA) survey estimates the number of pets of a wide range of species in the UK. These data are collected by an independent, international market research company (Kantar/Soular). The PFMA 2020 survey provided a direct estimate of about 200,000 snakes kept in the UK, in 0.4% of households (representing about 28% of pet reptiles). The PFMA 2021 survey (which was based on online responses) provided a higher estimate of about 400,000 snakes kept in the UK, in 0.8% of households (representing about 33% of pet reptiles).

20. The Pets at Home 'Pet Report' in 2014³ (pg. 11) presents data from the Pets at Home "VIP" membership scheme. These data suggest lower reptile ownership

³ <https://media.petsathome.com/content/images/Seasonal/Pet%20Report/2014PetReport.pdf>

than for dogs, cats, fish, or “small furrries” (including rabbits). Reptile ownership was at a maximum of 11% for Pets at Home VIP membership scheme owners under 20 years old and decreased greatly with age to about 2% for over 60 years old. A subsequent survey, the Pets at Home ‘Pet Report’ 2015 (pg. 9) presents the results of a survey of 4321 pet owners in the UK by an independent research company (Mustard Research). These data suggested reptiles amounted to 2% of the first pets cared for by respondents’ children

21. These data are comparable to a number of other sources in terms of absolute and relative numbers of different taxa, including several smaller studies of pet ownership by children and adolescents, the European Pet Food Industry Federation annual survey, the American Pet Products Association survey, the PDSA PAW Report 2020, the Welsh National Survey 2014-2015, the Pets at Home 2014 ‘Pet Report’, and the Pets at Home ‘Pet Report’ 2015. Broadly, these corroborate the PFMA survey figures.
22. Three studies have compared the presentation of the different taxa of reptiles to veterinary practices. Factors other than the relative numbers of tortoises, lizards, snakes and turtles in the UK will influence the presentation rates of the different taxa at veterinary practices. Nonetheless, all three found that snakes present much less commonly than do tortoises or lizards, of around 10% of reptiles.⁴⁵
23. The Reptile & Exotic Pet Trade Association (REPTA) estimate significantly different figures. The methodology of these estimates has not been published but were confirmed by REPTA to be estimates based on volume of food sold. There is debate about what proportion of those sales can be accurately assumed to be eaten by pet reptiles (rather than other species or non-pet reptiles). REPTA estimates over 8 million pet reptiles are kept in the UK as pets which includes an estimated 1.5-2 million snakes.
24. Industry sources suggest the majority of pet shops, when purchasing snakes from commercial sources, obtain them from one of two wholesalers. These two wholesalers supplied a total of 9,410 snakes to pet shops in England in 2019.⁶ However, many pet shops also buy from private breeders and some import reptiles directly. A reasonable “best estimate” suggested in evidence would be that between 30,000-120,000 snakes are sold from licensed pet shops annually.
25. The best source of data for species supply comes from industry data from the two major wholesalers. Supply from these companies to licensed pet shops in 2019 is given in Table 1. This suggests the vast majority (around 77%) of all snakes supplied are corn snakes and royal pythons. Other species are each only a small proportion of the total number of snakes. Overall, 120 species were supplied, 94 Colubridea species and 26 Pythonidea or Boa species, with most species sold only in single-figure numbers.

⁴ Whitehead M. *et al*, Reptile pets at the vets: The most common species presented, presenting signs & diagnoses made. BVZS Congress proceedings, October 2017, p105

⁵ Hawkins A. *et al*, Demography and veterinary care of reptiles attending primary-care veterinary practices in England. BSAVA Congress proceedings, April 2017, p533

Table 1 - Wholesaler percentage figures for snakes supplied to pet shops in the UK⁷

Snake species	Wholesale figures for snakes supplied to pet shops (%)
Corn snakes	57.0
Royal python	20.0
King & milk snakes	3.4
Boa constrictor	2.0
Garter snake	1.8
Hognose snake	1.7
Other species	14.1

Physiology and captive snake welfare

Background

26. Poor welfare associated with inadequate husbandry conditions can result in a disturbed physiological state in snakes. This may also result in illness and disease in captive snakes. However, normal health status or successful reproduction do not necessarily reflect an adequate welfare state for an individual snake or any other species.
27. Snakes' poikilothermic nature (dependence on selecting different environmental temperatures for adequate function of metabolism, body processes, enzymes, and digestion) makes them entirely dependent in captivity on being provided with a sufficient range of temperatures, a temperature gradient, to be able to select and regulate their own necessary body temperature for different metabolic processes to function. Without provision of a sufficient and correct temperature range, snakes cannot maintain normal physiology, and will become ill and suffer poor welfare. While exposure to temperatures markedly outside this range even for a few hours can cause sufficient physiological disruption to cause severe illness or even death, even a few degrees discrepancy from the optimum temperature range over a few weeks can result in sufficient physiological disturbance to result in clinical illness in many species.
28. Enclosure size must be adequate to provide the required temperature range gradient, referred to as a preferred optimal temperature zone, specific to any species kept. Stability of these temperatures is also essential for the most commonly kept pet snake species in the UK. A minimum temperature gradient of 24-30°C, with a 6°C reduction in temperature range at night, is generally recommended for basic normal physiological functions to prevent illness in these commonly kept species, but a wider temperature range is desirable. Larger enclosures allow more of a snake's body to be accommodated at its preferred temperature in the enclosure's temperature gradient.

⁷ Data presented to group

Physiological assessment of stress in snakes

29. Many physiological parameters are dependent on an individual animal's life stage (age), gender, season, and metabolic state, all of which can confound evaluations. In snakes, their poikilothermic nature is a further confounding factor in evaluating a physiological response to chronic stress and poor welfare states.
30. In many vertebrate animal species physiological parameters such as adrenal gland hormone levels circulating in the blood stream, have been validated for use as an assessment of acute or chronic stress. These hormones can be used to evaluate an individual animal's welfare under specific conditions, although low levels do not necessarily mean welfare is good.
31. Levels of the circulating adrenal hormones cortisol and corticosterone are widely accepted as biomarkers for stress in many vertebrate animal species. Corticosterone has been shown to be the main circulating hormone in snake species.
32. Normal and abnormal levels of circulating corticosterone appear specific to different species of snakes. Only a few snake species have had normal blood corticosterone levels determined scientifically.
33. Simply the act of handling and blood sampling a snake is enough to raise blood corticosterone levels. Circulating blood corticosterone levels reflect the physiological state of the snake over the short term and can change within minutes. This acute response could mask elevations due to chronic stress from a poor welfare state.
34. Due to their poikilothermic nature, blood sampling of snakes at different temperatures and at different times of their daily cycle will alter blood corticosterone levels, potentially confounding result interpretation.
35. Blood sampling to determine corticosterone levels can be technically difficult or potentially harmful in smaller snakes. Blood sampling snakes for corticosterone level determination for research purposes requires a licence from the Home Office under the Animals (Scientific Procedures) Act 1986.
36. Corticosterone may be detected in snake faeces and shed skin, which do not need invasive procedure like blood sampling. As these accumulate corticosterone over a period of time (faeces, during the gut transit time; for skin between skin shedding cycles) these samples do not seem likely to be affected by a single acute stress response due to handling, or normal circadian rhythms.
37. Shed skin corticosterone levels have been demonstrated to correlate with faecal and blood corticosterone levels, although only investigated in a very limited number of snake species. Snake skin is shed every few weeks, and so at best could only reflect the medium term (weeks) physiological state of a snake, and not longer-term impacts of specific captive husbandry factors. Different parts of the shed skin

contained different concentrations of corticosterone, so average levels for the whole shed skin must be determined.

38. In one snake species (African House snake) experimentally stressing snakes by regular handling, as assessed by behavioural means, did not demonstrate any elevated shed skin corticosterone levels. There are currently no studies correlating elevated corticosterone levels in shed skin with stress states or a snake's state of welfare.
39. Faecal corticosterone has been poorly investigated as an indicator of chronic stress in snakes. Faecal levels of corticosterone may also be influenced by the diet consumed. Faeces may be passed every few weeks, and so at best would reflect the medium term (weeks) physiological state of a snake, and not longer-term impacts of specific captive husbandry factors.
40. Faecal corticosterone was a poor predictor of suitable habitat in one wild snake species studied, and risks being of limited value in assessing the welfare status of captive snakes in different enclosures. There are currently no studies correlating elevated corticosterone levels in snake faeces with stress states or a captive snake's state of welfare.
41. There is currently insufficient published evidence to use any snake cortisol levels to assess the effects of enclosure size on the welfare status of an individual snake.

Mental and behavioural health and welfare considerations for captive snakes

42. Mental (psychological), behavioural, and physiological factors are all interlinked. Snake cognitive capabilities have been studied and complex behaviour in snakes has been recognised. Experiments into snake cognition have shown mental performances comparable to many birds and mammals so that snakes are now regarded to be complex animals, with attributes such as detailed spatial memory and learning and problem solving, being demonstrated and described. Recent research presented to AWC has shown that snakes have memories that match those of some dogs.
43. Many mental and behavioural needs are strongly related to those experienced under natural conditions which means that, although snakes have flexibility to learn, their primary needs are not changed by lifelong captivity in artificial environments. They should not be considered as animals that are domesticated.
44. While enrichment in captive conditions has been shown to stimulate more natural behaviour and result in improved health and welfare, the full range of normal behaviours cannot be expressed. In keeping with other species and taxonomic orders, the biological need of a snake to explore and control its own space is a fundamental driver.

45. A normal behaviour of all snakes that may vary in extent is that of motion. Snakes are usually considered to move in one of four ways, rectilinear, sidewinding, lateral undulation and concertina, although recent research has broken down these four characteristic movements further and shown that individual species may move differently dependent upon the activity being undertaken or the terrain encountered.
46. All species of snakes studied naturally occupy large home ranges in nature e.g. ranging from 2400 sq. metres for some viper species to 22 sq. kms for Burmese pythons, and as such are less adaptable to captive environments, resulting in compromised welfare. Some snake species may display periodic low locomotor or sedentary habits due to transient physiological states such as resting, nesting, or digestion or due to seasonal or weather temperature related reductions in activity. Rectilinear behaviours are normal for most species whether static or in movement. The extent of straight line stretch posture being variable. Table 2 shows the length of commonly kept snakes in pet selling establishments.

Table 2 - Length of commonly kept snakes.⁸

Snake Species	Length (cm)
Corn snake	60-180
Royal (ball) python	120-170
Boa constrictor	180-300
Milk snake	90-200
King snake	100-200
Garter snake	70-120
Hognose snake	50-90
Anaconda	300-500
Burmese python	250-450
Green tree python	90-140
Reticulated python	250-600
Rock python	250-450

Assessing signs of welfare using behaviour

47. There are currently in excess of 25 behavioural signs of captivity-related stress that have been documented in snakes and these have been incorporated into a variety of experimental designs in order to assess welfare. The interpretation of these signs as being abnormal, maladaptive and stress-related rather than “normal” is context specific which reflects how difficult it is to measure snake welfare in an objective way as the combinations of behaviours have to be interpreted within the specific contexts.
48. Broadly, behavioural signs of captivity-related stress in snakes can be split into two primary categories: ‘exploratory and escape’ and ‘biological shutdown’. i.e. the snake will either evade the problem by removing itself from the area, or, by hiding away from it. In captivity, neither of these avoidance strategies work well, either

⁸ Data presented to group

because there is insufficient space to escape a stressor or because stressors are constant and thus hiding from the stressor will not make it 'go away'. This can lead to either hyperactivity or hypoactivity being observed.

49. Snake behaviour and welfare in captivity are subject to similar considerations as for birds, mammals, and other animals. In the wild, the key behaviours of free-living snakes commonly observed and documented under confirmed condition of stress are high level locomotor activity, escape activity, increased exploratory activity, and anorexia; the finer details depending on the particular species and circumstances giving rise to the stress. The key point is that the snake will attempt behaviours in order to remove itself from the stress.

Mental and behavioural health in small enclosures

50. Snake thigmotactic tendencies (the motion or orientation of an organism in response to a touch stimulus) are due to mechanoreceptors in their skin that aid in tactile sensing for moving through tunnels and this behaviour is transient. Preference studies show that snakes prefer larger, more naturalistic environments than smaller barren enclosures where environmental enhancement is difficult to achieve. The ability to exercise control over their choice of environment is a fundamental need of all animals, including snakes, that is essential to their well-being. For snakes this is of particular importance where temperature control is a basic health/physiological requirement. This is achieved by providing a variety of environments, for example by use of enrichment apparatus that allows the animal to select the environment it wishes such as different light levels, essential temperature control by use of substrate materials, exposure to different levels of relative humidity by use of space. Such control is essential not only for the expression of normal behaviour, but also to aid in the alleviation of stress and for the maintenance of good health.
51. Where conditions allow such behaviour, it has been observed that snakes engage in elongated postures. Rectilinear (straight-line) behaviours, both static postures and movements, are a normal behaviour although not shown all the time by all species. Snakes need to be able to express these normal behaviours, reduced space will limit this, so space in all three dimensions needs to be maximised for extended periods of time.
52. Enclosures that allow for full body extension will encourage normal activity and it has been shown corn snakes (*Pantherophis* sp.) show significant preference for enriched and larger enclosures, as well as behavioural signs indicating improved welfare.
53. Physiological health and welfare considerations for captive snakes can include stressors that cause short-term stress that then have longer-term implications for welfare.
54. Stress impacts on homeostasis requiring an adaptive response and compromised homeostasis can constitute a threat to health, survival and welfare. In snakes, minor challenges to homeostatic stability and welfare often go unnoticed, but may become problematic and manifest in subclinical states following a sequence of

cumulative 'micro stressors'. Stressors can be overt or relatively covert, but both can have serious consequences for captive snake health and welfare. Behavioural indicators of stress are therefore recommended as co-indicators with any physiological measures in evaluating the health and welfare of captive snakes. However, it is recognised that, with the current state of knowledge, even combined physiological and behavioural measures may be insensitive to the presence of stress in snakes.

55. Like other species, snakes can become habituated to certain stressors, but they can also become over sensitised to them.
56. Studies show that a stimulating environment that promotes species-typical behaviours improves reptile welfare as evidenced by positive behavioural indicators. Habitat modifications including more space, increased spatial complexity and the addition of climbing structures have also yielded positive behavioural results for corn snakes. Which type and quantity of enrichment for any one species is still the subject of research as the demands are species variable.
57. Studies involving capture, handling and translocation to evaluate acute stress responses among free-living snakes show that they sometimes normalise within 8 hours post stressors showing that some acute stress events may have little or no longer-term effect. This may reflect those stressors that start and end within a circadian segment ('an animal's day') may not carry forward in all cases.
58. Snakes appear to cope well with limited mild short-term stressors, but they are susceptible to multiple simultaneous stressors and whereas some acute stress episodes may be coped with, others may result in longer-term negative effects. Signs of poor health, poor management and disease are associated with chronic stress and poor welfare.
59. A feature of snakes that has relevance to stress, immunity and disease, is their poikilothermic biology. Thermoregulation in reptiles is achieved substantively through behaviour as they select warmer or cooler temperatures to attain a highly specific desired optimum. Thermoregulation is achieved by using subtle differences in surroundings to achieve differences in body temperature together with temperature-maintaining behaviours which are essential to snake welfare.
60. Snakes have been shown to voluntarily increase body temperature by more than 8°C following feeding ('postprandial thermophyly'). In contrast, imposed single constant temperatures for as little a few days can be deleterious to health for many species and variation in temperature is required as inappropriate thermal conditions can suppress immunocompetence.
61. Most reptiles are hard-wired to perform thermoregulatory behaviour in thermally diverse environments and placing them in a thermally uniform environment will suppress normal behaviours such as foraging behaviour. Variation of body temperature is fundamentally important to the snake's key biological processes including immunity, metabolism, ability to cope with stressors, and general health,

and small enclosures provide less opportunity for essential variable thermoregulation.

Signs of overt stress in snakes include:

- Striking (often at the enclosure glass)
- Loud/defensive hissing
- Open mouth displays/flattening of the body
- Musking
- Constant and relentless movement against the vivarium glass, “nosing” at the vivarium glass.
- Sustained hyperactivity/inability to settle

Common signs of ill health visible with the snake in situ within the enclosure include:

- Dysecdysis (patches of retained shed skin)
- Sunken eyes
- Sagging skin
- Swelling around the face/mouth
- Open mouth breathing/wheezing/abnormal respiratory noises
- Lack of coordination/star gazing
- Visible ectoparasites on the external skin
- Emaciation/poor body condition

62. By comparison with most other commonly kept taxonomic species e.g. birds and mammals, loss of appetite is not readily apparent because of the length of time between feeds that can be considered normal, i.e. measured in multiple days or weeks rather than hours. The keeping of written feeding records is a requirement, subject to open inspection by buyers and inspectors, for those keeping and selling snakes as a retail business. The failure to feed may be manifest by other signs developing notably loss of condition, growth rate, weight or even emaciation.

Conclusions

63. Snakes are not domesticated, as the word would usually be understood when applied to companion animals. Snakes would revert to most wild living behaviours given the chance.

64. The original and current regulations and guidance were based originally on the opinion of a group of keepers of reptiles and specialist veterinarians. At that time there was little scientific evidence available as to the size of a vivarium and what temporary should mean in terms of duration. Those original values should be seen as the first informed attempt to provide advice in the setting up of regulations and as guidance for enforcement.

65. There has been not just a change in the way in which welfare is assessed but also in the amount of research that has been undertaken on snakes. Considerable number of studies have been undertaken into the way snakes behave in captivity and as to how to enhance their captive life to meet behavioural as well as health and physical welfare requirements. There is little doubt that as more evidence from research becomes available the need for further change will occur.

66. Environmental enhancement is not a substitute for space and should not inhibit the normal behaviour regarding all forms of motion for the species.
67. While there are some common basic requirements for all snakes there is also the convenient but biologically untrue assumption that all snakes are the same in their captive requirements. Species specific needs aside, in general, there is no reason why snakes, as legless reptiles, should be treated differently from other reptiles that have legs.
68. After birth and initial rearing snakes destined for sale are subject to transportation, display for sale and then long-term keeping. Some are then also bred. Each has separate and discrete requirements in terms of physical structure and conditions if the wellbeing both physically and mentally of the snake is to be protected and maintained.
69. Snakes are sensitive to smell/taste, vibration and sound which all point to the requirement to ensure that the environment in which they are kept should match their environmental, physiological and behavioural needs as far as is possible when in captivity.
70. Any figure attempting to justify minimal requirements for short-term keeping driven by practical considerations for keeping for selling are not those that should be considered as being the acceptable long-term requirements to give a snake a life worth living or a good life.
71. The size of the vivarium should be considered as to whether it matches the requirements of the snake species and particularly if it is to be displayed for sale for any agreed short-term period of time.
72. When viewing a snake in an enclosure the judgement as to the length of the snake involves some estimation whilst the dimensions of a vivarium can be accurately measured.
73. Any retail establishment should carefully consider and be able to justify from a welfare point of view, the need to keep or display more than one of any particular species under the conditions deemed acceptable for retail display.

Recommendations

74. The basic belief of AWC is that animals should be given, at a minimum, a life worth living but always aiming for a good life. Any consideration as to size of vivaria, and the length of time that a snake should be kept in that vivarium, should not be aimed at a minimum but at an optimum.

75. That at a minimum for purposes of short-term display, a vivarium should allow a snake to display as much normal behaviour as can reasonably be provided and managed. It must also ensure the maintenance of physical and mental health.
76. The aim for all terrestrial snake species should be a minimum of 1x the snake's length for the length of the vivarium and 2/3x [two thirds] the snake's length for the width and 1/3 [one third] for the height of the vivarium. For arboreal species the minimum should be 1x the snake's length for the length of the vivarium and 2/3x [two thirds] the snake's length for the width and for the height of the vivarium.
77. However, even these increased dimensions will still restrict the freedom to display the full range of normal movement and consequent behaviours and therefore should be limited in time and should never be considered as adequate in the long term. The additional volume of vivaria for arboreal species is required for branches or furniture, thereby limiting space usable by a snake.
78. Any size consideration must err on the greater size for any estimation of a snake's length. The size must be that of the live snake and not a table valuation. Snakes should not be forcibly handled to determine size values.
79. Any length of time for temporary restrictions is currently a matter of expert opinion rather than scientifically proven fact. However, the current length of three months is not considered reasonable. Even with the suggested increased size as set out in para 76, display in restricted sized vivaria should not exceed 14 days. Removal and return to such restricted vivaria on any retail premises should not be allowed for 2 months from the date of removal.
80. Being poikilothermic the reliance on adequate temperature gradients in vivaria is fundamental to the well-being of snakes and the sizes of vivaria need to reflect this in design. Given that a snake must accommodate enough of its body in a specific temperature zone to maintain optimum body temperature and overall health, any vivaria should have sufficient space for a snake to be able to move to achieve this status.
81. In line with animal welfare legislation, if a snake is of such a size that it cannot be properly managed to meet the required welfare standards, irrespective of any specific housing requirements, it should not be kept.
82. All snakes displayed for sale or potential sale whether through recognised outlets or privately should be accompanied with clear advice that the sale based vivaria may not or does not reflect what will be needed when taken to a long-term site for keeping. This is particularly true where the snake is bought or obtained at a young age.

83. If the keeping and sale of snake species is to continue then there is a duty on both those that wish to undertake this as either a hobby or a living and on government that allows or regulates the keeping of them, to ensure that sufficient quality research is undertaken to ensure that the welfare needs of any such species is fully and properly accommodated.

Glossary

Dysecdysis: abnormal shedding of the skin of reptiles, usually due to undernutrition or too cold or too dry environment.

Homeostasis: a tendency of biological systems to maintain stability while continually adjusting to conditions that are optimal for survival. Homeostatic mechanisms are necessary for the body to regain its balance when disease or injury occurs and to maintain that balance if it is to remain healthy.

Musking: The passing of strong-smelling faeces and scent gland contents as a defensive deterrent, usually against predators, by some snake species

Poikilothermy: The physiological state of having body temperature that varies with that of the environment

Enrichment: animal husbandry principle that seeks to enhance the quality of captive animal care by identifying and providing the environmental stimuli necessary for basic psychological and physiological well-being.

Rectilinear: Contained by, consisting of, or moving in a straight line or lines.

Thermoregulation: the physiological process controlling the balance between heat gain and heat loss in the body so as to maintain body temperature.

Post-prandial thermophily: increased body temperature by production or environment selection, following feeding, to aid effective digestion

Thigmotaxis: movement of an organism in response to the stimulus of contact, to exercise control over their choice of environment

Vivarium: An enclosure, container, or structure adapted or prepared for keeping animals, aiming to replicate the most basic natural environment conditions

Appendix 1: AWC Members and those who gave evidence and assistance

AWC Membership 2021

Peter Jinman – Chairman

Martin Barker

Dr Andy Butterworth

Richard Cooper

Dr Jane Downes

Dr Troy Gibson

Dr David Grumett

Dr Carmen Hubbard

Richard Jennison

Richard Kempsey

Dr Dorothy McKeegan

Dr Romain Pizzi

Dr Pen Rashbass

Professor Sarah Wolfensohn

Dr James Yeates

The committee was grateful for the participation and advice provided by:

Chris Newman

Clifford Warwick

Martin Whitehead

Michael Stanford

Rebeca Garcia

Tariq Abou-Zahr

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Anna Wilkinson - Professor of animal cognition (University of Lincoln).

Daniel Calvo Carrasco – specialist veterinary surgeon in the UK private sector.

Dave Perry – cofounder of Peregrine Live Food, keen herpetologist, member of Companion Animal Sector Council.

Livia Benato– Lecturer (University of Bristol), small mammal and exotic vet, specialist in zoological medicine.

Mike Jessop – Veterinary practice, expert inspector of pet shops, experience in treating exotic animals.

Nicola Rooney –Companion Animal welfare and behaviour lecturer (University of Bristol).

Oliver Burman - Animal behaviour and welfare researcher (University of Lincoln).

Rachel Grant - senior lecturer (London South Bank University).

Rob Quest – Assistant Director at the City of London Corporation, operates Heathrow Animal Reception Centre.