

# Control of canine rabies in developing countries: key features and animal welfare implications

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## Summary

Over 90% of human deaths from rabies worldwide are caused by dog bites. Mass vaccination, along with the effective control of dog populations, has been used successfully in industrialised countries to control this disease. A lower success rate in developing countries is due to a number of factors, including vaccination campaigns that do not cover a sufficient number of animals or reach all communities, and a wide biodiversity that increases the number of reservoirs of the rabies virus.

Educational programmes are needed, which focus on the commitment involved when acquiring a domestic animal, stating clearly what is required to provide it with a good quality of life. New technologies developed in the industrialised world will not always be successful in less developed countries. Approaches must be adapted to the particular conditions in each country, taking cultural and socio-economic issues into account. Authorities must promote research on dog population dynamics, the development of non-invasive methods to control dog populations and the most efficient, stable and low-cost options for vaccination.

Under the One Health model, it is hoped that dog-transmitted human rabies will be accorded high priority as a zoonosis by human health authorities, international authorities and donor agencies to support ambitious eradication goals, particularly those being set in South-East Asia. Well-designed and adequately resourced vaccination programmes, based on the World Organisation for Animal Health (OIE) guidelines, will have significant animal welfare benefits, due to the availability of improved vaccines (in terms of efficacy, duration of immunity, ease of administration and lower cost), advances in dog population management and the more widespread implementation of the OIE Guidelines on Stray Dog Control. Animal welfare benefits include not only the elimination of pain and suffering caused by the clinical disease itself, but also the avoidance of the indirect impact of inhumane culling when methods are used that have not been approved by the OIE.

## Keywords

Animal welfare – Canine – Canine rabies – Developing country – Dogs – Rabies – Vaccination.

## Introduction

Rabies is one of the oldest recognised diseases and it is present on all five continents. However, its presentation has evolved epidemiologically in different ways across the world. For a long time, this disease was classified into two main epidemiological cycles: urban rabies (meaning that

dogs are responsible for the transmission and maintenance of the disease to humans), and wildlife rabies (in which the disease is maintained and transmitted by wild mammals).

Mass vaccination, along with effective control of dog populations, has successfully been used in industrialised countries (1) to control urban rabies, showing that the disease can be eliminated by vaccinating the reservoir

animal population. However, infected dogs remain the primary source of human exposure in Asia, Africa and Latin America (2, 3). According to the World Health Organization (WHO), rabies annually causes around 60,000 deaths worldwide (3), ranging from thousands of deaths in Asia and Africa to a few hundred in Latin America. The majority of human cases (90%) result from the bites of rabid domestic dogs (4), and 60% to 70% of the victims are children, aged 5 to 15, although this may be an under-estimate as dog bites in children are sometimes not recognised or reported. Approximately 100 children die of the disease every day (5) in regions where domestic dogs are the most important maintenance host (6). Canine rabies control or eradication is considered to be the most effective solution to prevent deaths in humans and livestock.

Many factors help to explain the relative lack of success of vaccination campaigns in developing countries, as compared to developed countries. For example, the campaigns are not always well managed; vaccination does not cover a sufficient number of animals, nor does it reach all communities; and the vaccines themselves are not always handled or applied correctly. The wide biodiversity present in many developing countries also complicates rabies control, because it increases the number of possible reservoirs of the rabies virus. This condition favours the 'spillover' phenomenon from wild reservoirs to domestic animals, such as dogs.

Theoretical and empirical analyses indicate that vaccinating 70% of dogs should be enough to prevent epidemics and to eliminate endemic infections, breaking the rabies transmission cycle (7). Some countries have a comprehensive rabies control programme, whereas it is a neglected disease in others, due to competing public health priorities and the complex nature of rabies control activities (8).

This paper outlines the significant challenges associated with attempts to control and eventually eradicate rabies in Africa, Asia and Latin America. Since many such challenges are not unique to rabies, other control or eradication programmes may benefit from the insights derived from this disease. The animal welfare implications of rabies and some control measures are discussed briefly at the end of the paper.

## Africa

The history of rabies in Africa is not well recorded. However, it is widely accepted that the disease must have been present in northern Africa hundreds of years ago, principally as an urban disease of dogs, and also in the Middle East, associated with epidemiological cycles. Only during the 19th and 20th Centuries did rabies become epizootic in many countries of sub-Saharan Africa. In this region, the disease has become well established in dogs and involves wildlife species over large areas (9).

At the present time, rabies continues to spread into new reservoirs and territories and no regions or countries are known to be free of the disease on the African continent (10). Some studies estimate that the number of deaths officially reported greatly underestimates the true incidence of the disease (6, 11).

### The role played by dogs in Africa

In rural Africa, households with livestock own significantly more dogs than households without livestock, probably because the dogs are mainly kept for livestock safety. Nevertheless, in some pastoral communities, dog movement is not restricted, household animals are dispersed, and the populations are nomadic (12). Some studies have demonstrated that the proportion of wild dogs to all dogs in pastoral and agro-pastoral communities in rural Africa is likely to be small (13). For example, one study showed that wild dogs, estimated from direct observation, represented only 3% to 5.4% of the total population and thereby reflected their potentially negligible negative impact on the benefits of vaccination coverage (12).

In the case of domestic dog vaccination, socio-economic and cultural factors, including religious and other beliefs, are likely to influence dog-human relationships, which – in addition to low community awareness and attitudes towards rabies and dogs – can compromise dog vaccination programmes (12).

### Vaccination coverage and the number of human rabies cases caused by dogs

Rabies remains a persistent problem in Africa because, to date, very few vaccination programmes have been successful (12, 14, 15, 16). The cost of vaccination has also been a considerable obstacle because owners are unwilling or cannot afford to participate (17).

Other reasons for the failure of vaccination strategies, which, in this area, are limited to adult dogs, include the following (12):

- the nomadic pastoral lifestyle of some tribes, living at low densities in remote and operationally difficult areas
- the abundance of wild animals
- the perceived existence of many inaccessible stray or ownerless dogs
- weak surveillance and diagnostic capacity
- insufficient resources available to Veterinary Services
- not including puppies in the rabies vaccination campaigns.

Herd immunity and coverage levels may also be affected by village and household characteristics (such as the distance from district headquarters, hospitals and central vaccination points), and by dog characteristics, such as the age at which dogs are first vaccinated or the degree to which dog movements are restricted (12).

Some studies in rural Africa have suggested that the number of dogs in one household does not influence the chances of a dog being vaccinated and the surveys show that dog owners are likely to vaccinate all of their dogs (12). Nevertheless, given the high birth rate in the dog population, the inclusion of puppies in vaccination programmes is probably important to maintain sufficient herd immunity for rabies control. Although this could result in substantial epidemiological and economic benefits (12, 13, 15), many countries have adopted the policy of not vaccinating dogs before they are three months old (18). Dogs less than six months old are significantly more important in rabies transmission to humans (19) and more likely to be accessible for vaccination than older dogs.

### **Prioritisation by authorities**

In Africa, rabies is often handled separately by health and veterinary authorities, and confusion about who is responsible for controlling the disease is common (10). In 2010, Lembo and colleagues (17) identified four common reasons for the lack of effective canine rabies control in Africa:

- a low priority given to disease control as a result of the lack of awareness of the rabies burden
- epidemiological constraints, such as uncertainties about the required levels of vaccination coverage and the possibility of sustained infection cycles in wildlife
- operational handicaps, including the accessibility of dogs for vaccination and insufficient knowledge of dog population sizes when planning the vaccination campaigns
- limited resources for the implementation of rabies surveillance and control.

### **Lack of resources**

One of the critical impediments to sustaining vaccination programmes is their affordability in developing countries. Implementation of bi-annual, as opposed to annual, rabies vaccination campaigns is likely to be significantly more costly and therefore less affordable. As annual vaccination campaigns repeatedly achieve coverage of around 70%, leading to a significant decline in rabies (13), annual campaigns could be sufficient in rural Africa, but further research is needed to corroborate this premise (12).

Observations at a Central Point (CP) vaccination post indicated that more than 80% of people who brought dogs for vaccination were children aged less than 14 years and they are generally considered to be economically inactive (12).

If endemic infection in high-density populations can be eliminated through mass vaccination, this might diminish the need to vaccinate in very low-density populations which are relatively inaccessible and where the costs of control are high. However, in the Serengeti, while rabies persists in adjacent domestic populations, sustained vaccination in low-density communities is still likely to be important to prevent outbreaks and protect wildlife known to be threatened by this disease.

### **Remarks**

No single vaccination strategy is likely to be effective in all populations and therefore alternative approaches must be adopted in different settings. The combined Central Point/Community-based Animal Health Workers (CP-CAHW) strategy attained the highest vaccination coverage in pastoral communities, indicating that the use of CAHW is a potentially effective means of increasing the coverage and cost-effectiveness of rabies vaccination in these areas (12). In areas with limited official Veterinary Services, logistical problems and poor infrastructure, this approach could be regarded as an alternative service model for the veterinary sector where conventional models have failed (20).

Implementation of CP vaccination depends on the active participation of the owners, which may be influenced by social, cultural and economic factors (21, 22). Determining the optimal vaccination catchment area per CP is crucial to the success of a programme, as coverage declines progressively with increasing distance from the CP (12).

Encouraging dog owners to bring their puppies in for vaccination should also be considered. This action may be the single most effective way to improve coverage levels and is likely to be associated with low *per capita* costs (12).

Finally, it is important to consider that dog vaccination campaigns are most cost effective in terms of disability-adjusted life years averted, because of the reduced need for expensive post-exposure prophylaxis (PEP) (23).

## **Asia**

Rabies is one of the oldest diseases documented in India since the Vedic period (1500 to 500 BC), having been described in the ancient sacred Hindu text, the Atharvaveda. At present, rabies continues to cause significant human

mortality in Asia and where the disease is endemic it has socio-economic consequences. Although the impacts of rabies on livestock are understood to be significant, to date there have been very few detailed studies of them in Asia. Japan is free of rabies, and countries such as Thailand, the Philippines and Sri Lanka have been able to reduce human deaths to a great extent.

### **The role played by dogs in Asia**

Dogs are the main reservoir and vector of rabies in humans and animals in Asia. Human deaths are caused mainly by bites from rabid dogs and these can represent up to 93% to 96% of all animal bites. There is a possibility of virus transmission from wildlife to dogs and *vice versa*. A field study of one rabies virus in Nepal indicated that it originated from Arctic foxes, while a different strain of rabies virus isolated from two dogs and a mongoose in the same country was identical to a virus from a human case (24).

In general, dogs are regarded as companion animals/pets across Asia, but they are also kept for security. Dog ownership is highly variable, due to multicultural and religious influences across the region (25). Ownership may be broadly categorised into owned dogs, community dogs and stray dogs. In the case of the owned dogs, different attitudes to the responsibility of pet ownership can be observed among their owners. A lack of awareness of dog behaviour, health and welfare; differing cultural practices and lack of veterinary care are the factors determining these differences.

In most Asian countries, free-roaming dogs are well known to the communities who look after them, especially in suburban and rural areas, but the level of care may be influenced by culture or religion. Community dog populations represent the majority of dogs, so that human interaction with this type of dog population is common.

Controlling rabies by eliminating dogs using lethal methods has not made much progress over any extended period (26). Dog population control through surgical sterilisation is widely accepted and practised across most of Asia.

### **Vaccination coverage and number of human cases caused by dogs**

A considerable number of deaths due to rabies occur each year in Asia. However, it is difficult to accurately estimate the number as not all cases are recorded. Many people with dog bites seek alternative, non-medical treatments, mainly due to their cultural beliefs, so many bites are not recorded by medical facilities. Few rabies cases receive laboratory confirmation and clinical cases are often not reported to the central authorities. In India, the annual incidence of rabies deaths is estimated to be about 20,000, or about two

per 100,000 inhabitants (27). Nevertheless, rabies remains a neglected disease in many countries. Dogs remain the primary vector and reservoir of rabies (28).

Many countries in Asia are aiming to eliminate rabies by 2020. Controlling the disease by vaccinating the dog population and achieving 'herd immunity' is fundamental to the elimination of both human and animal rabies. However, most canine vaccination programmes in Asia have not yet reached the 70% coverage rate needed for this and *ad hoc* vaccination fails to produce herd immunity. One key contributory factor is the inability to vaccinate community or free-roaming dogs. Other factors include a lack of coordination between different sectors, limited funding, inadequate planning and a lack of expertise and technical knowledge, along with too few trained personnel. Furthermore, authorities may not be highly motivated to implement dog rabies control because of pressures from competing priorities and a lack of epidemiological data to analyse the situation properly.

### **Prioritisation by authorities**

In Asia, rabies control programmes do not generally come under the oversight of a single Ministry or department, yet rabies is a typical zoonotic disease in terms of the 'One Health' concept. Ministries of agriculture, departments of livestock and human health, and local governments tend to have shared responsibilities for controlling the disease. Although some countries, such as Sri Lanka, have a separate department within the Ministry of Health responsible for controlling rabies, in many countries rabies is not a priority disease in the human health sector. The same occurs in the animal health sector, where a much higher priority is given to livestock than to companion animals, including dogs, so that rabies control measures are generally neglected. For these reasons, there is an overall lack of coordination and collaboration among the Ministries and departments involved in controlling rabies in Asia. Yet it is extremely important to design and develop national policies to eliminate this disease, and thus to boost inter-Ministerial or sectoral collaboration towards the success of the programme (29). National policies and legislation are also required to support responsible pet ownership and implement dog licensing and vaccination.

Further collaborative work is required across geographical regions to eliminate rabies. Regional organisations, such as the Association of South-East Asian Nations (ASEAN) and the South Asian Association for Regional Cooperation (SAARC) (30), have already identified rabies as a priority public health issue and are committed to eliminating the disease in their region by 2020. To this end, ASEAN countries recognise the importance of inter-sectoral collaboration and commitment and the necessity to develop national action plans to control rabies and follow the vaccination guidelines of the World Organisation for Animal Health (OIE).

## Lack of resources

For comprehensive rabies control programmes to run sustainably, considerable resources and practical commitment are required on an annual basis. The availability of effective vaccines for dogs is a crucial issue in many countries, most of which have to rely on importing vaccines to maintain the desired quantity. This is extremely costly. Strengthening vaccine production, at least at the regional level, or finding a way to deliver quality vaccines at subsidised prices is an important priority in developing countries.

Many countries lack the technical expertise to carry out mass dog vaccination programmes, especially in terms of human resources. In most situations, the humane handling of community dogs for vaccination requires specialised skills. Implementing country-wide vaccination programmes requires the mobilisation of considerable staffing resources to cover large geographical areas. There is also a need to identify and address a generally poor understanding of the disease and of the specific control measures.

A robust system to gather data on dog vaccination from the field to monitor vaccination coverage is vital. However, such systems are usually lacking or inadequate in Asian countries, where mass dog vaccination is practised.

The success of any disease control programme relies on an accurate surveillance system. Many Asian countries currently lack such a system for rabies, so that it is not possible to generate the required evidence-based data to properly assess the impact of control programmes. As a result, it can be difficult to convince policy-makers and governments to prioritise rabies control and to allocate the funds and commit the other resources that are required.

## Remarks and perspectives

It is important to work at a coordinated regional level, considering the cross-border transmission of rabies. Therefore, combined and coordinated regional efforts to eliminate rabies in ASEAN and SAARC Member States are crucial.

Countries need to adopt and strengthen their capacity to counteract rabies, while being sensitive to the socio-cultural acceptability of the methods they mean to use to do so. Understanding country-specific dog population issues, especially dog ownership and population size, is crucial in planning mass dog vaccination campaigns. There is also a need to develop and promote relevant local technology.

Vaccination centres can be used effectively where there is a high degree of dog ownership. Otherwise, more costly door-to-door vaccination programmes must be used to vaccinate free-roaming community dogs.

It is very important to work with communities and build awareness about responsible pet ownership, which will prove beneficial in the future. Rabies control programmes can be used as a vehicle to raise awareness about responsible dog ownership and bite prevention, as well as the availability and proper use of PEP.

Accurate laboratory diagnostic facilities for human and canine rabies are vital for gathering disease surveillance data. Canine rabies diagnosis is neglected in many countries, yet it is crucial to have high-quality laboratory support to implement successful rabies control programmes.

## Latin America

### The role played by dogs in Latin America

In the large cities of Latin America, dogs are mainly companion animals and attention is generally given to their basic needs, such as shelter, food and veterinary care, just as in more industrialised countries. However, these large cities also have communities that 'adopt' stray dogs and feed them, but do not provide them with other kinds of care. It is common to observe the formation of packs in protected natural reserves or parks surrounded by dense human populations (31). In Mexico City, approximately 7,000 stray dogs have been euthanised each year by the official Public Health Institution (Secretaría de Salud) because, for every year between 2000 and 2008, there were around 100,000 dog attacks on humans in Mexico (32). Moreover, it is known that in areas with a low human population density, feral dog packs may attack sheep, goats or calves (A. Setién, personal observation).

### Vaccination coverage and number of human rabies cases caused by dogs

In most Latin American countries, mass vaccination of dogs has been implemented. This has led to a decrease in human and dog rabies by nearly 90%. This experience shows that efforts to reduce human deaths from rabies through expanded dog vaccination and improved access to PEP has resulted in significant monetary savings (2). Nevertheless, more than 20 administrative units with high densities of human population in Mexico, Brazil, Guatemala, El Salvador, Colombia, Venezuela and Bolivia, among others, reported cases of dog rabies between 2005 and 2007 (33). Therefore, control efforts must be sustained as the number of people at risk in these areas is high. As in the other developing countries in Asia and Africa, puppies (34) have an important role in the transmission of rabies to humans (35).

Between 2010 and 2012, Mexico, Colombia and Ecuador did not report any cases of human rabies transmitted by dogs. Bolivia reported a total of seven, Brazil and the Dominican Republic each reported five cases, Peru four, Guatemala three, and Honduras one. The exception was Haiti, in the Caribbean Sea, where 16 cases were reported (36); a contributory factor here was probably the 2010 earthquake.

### **Prioritisation by authorities**

In most of Latin America, rabies is given high priority. There is an obligation to report any rabies cases to health Ministries and multilateral bodies, such as the Pan American Health Organization (PAHO), and governments invest in free vaccination programmes for domestic animals. Poor and remote regions present a major problem as achieving sufficient coverage is difficult and the rabies virus persists.

### **Need for research**

Governments in Latin American countries have generally invested in rabies vaccination and in dog population control, with some success. Yet, the problem remains latent in poor and remote regions. To control rabies in these places, it is necessary to invest in research. Locally focused research is needed because the particular geographical, biodiversity and socio-economic characteristics in these areas mean that the use of technology developed in industrialised countries is sometimes not effective (37, 38, 39, 40, 41, 42, 43).

Research resources in Latin America are generally applied to diseases that cause the greatest number of human deaths and that have a global impact. At present, support for rabies research does not have a high priority because, compared to these other diseases, rabies causes far fewer human deaths annually in this region. In addition, more innovative technologies and research are needed; for example, stable vaccines which are cheaper and easier to apply, studies on dog population dynamics and the development of new technologies for dog population control. However, such developments are usually rare in Latin American countries.

### **Perspectives**

The following actions are required to improve control programmes for rabies in Latin America (33, 37, 40, 41, 42, 43).

- to increase information and education about the commitment involved in owning a domestic animal, which includes all the requirements for a good life

- to reinforce within the community the need to eradicate stray or ownerless animals

- to create awareness about not abandoning animals and of the need to sterilise them

- to avoid sterilising dogs using invasive methods, such as surgery and the use of necrotising parenteral substances like zinc gluconate, and at the same time encourage the development of non-invasive methods, such as oral phytoestrogens and innocuous parenteral substances

- to avoid lethal culling, since it is expensive, antagonises communities and can spread the disease, due to the movement of animals out of infected areas where culling is taking place

- to encourage the development of new, more stable and low-cost vaccines; for example, painless DNA intranasal vaccines or oral vaccines for use in dogs in remote and poor areas

- to encourage studies of dog population dynamics.

## **Animal welfare implications**

The control of canine rabies has been achieved in two major ways: *i*) sustainable herd immunity, and *ii*) population management. In some countries the dog culling approach has been used, although it has proved to be ineffective, as such lethal strategies require the elimination of 50% to 80% of dogs each year, which is neither financially possible nor ethically acceptable (44).

Dogs suspected of being rabid should be restrained and observed by specialists. If clinical signs of rabies are shown, the animal should be killed humanely for laboratory diagnosis. Vaccination against rabies prevents the development of the disease, thereby avoiding the related suffering of animals and humans, and also achieves control in ways that meet acceptable welfare standards.

Vaccination campaigns must be conducted, along with raising the awareness of dog owners about their responsibilities to maintain good animal welfare, prevent disease and provide appropriate veterinary treatment, as well as shelter, management and nutrition, humane handling and, when necessary, the use of humane killing methods. When animals are killed for disease control or pain mitigation purposes, the methods used should result in immediate death or immediate loss of consciousness lasting until death (45). When the loss of consciousness is not immediate, the induction of unconsciousness should be non-aversive or by the least aversive method possible, and should not cause avoidable anxiety, pain, distress or suffering in animals (45). All these established strategies

must be applied according to the OIE *Terrestrial Animal Health Code*.

It may be concluded, therefore, that an increased and better-coordinated use of well-designed and adequately resourced vaccination programmes, based on OIE Guidelines, will have significant animal welfare benefits. Specifically, animal welfare will be ameliorated by the availability of improved vaccines, in terms of efficacy, duration of immunity, ease of administration and cost, as well as by the more widespread implementation of the OIE Guidelines on Stray Dog Control and advances in dog population management. Further benefits result not only from the elimination of pain and suffering caused by the clinical disease itself, but also from avoiding the indirect impacts of inhumane culling when methods that have not been approved by the OIE are used.

Finally, as rabies is a neurotropic virus that causes a very painful and distressing disease, it should be considered important, not only as a result of the number of cases caused, but also because of the immense suffering experienced by both humans and animals. When considering the One Health concept, rabies must be recognised as a high-priority zoonosis by all the institutions involved and eradication should be a global goal.

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# La lutte contre la rage canine dans les pays en développement : principaux aspects et conséquences pour le bien-être animal

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## Résumé

Plus de 90 % des décès humains imputables à la rage dans le monde font suite à une morsure de chien. Dans les pays industrialisés, la vaccination systématique et le contrôle effectif des populations de chiens ont été appliqués avec succès pour lutter contre cette maladie. Plusieurs facteurs expliquent les résultats moins satisfaisants obtenus dans les pays en développement, notamment le nombre insuffisant d'animaux couverts par la vaccination ou le fait que certaines communautés demeurent exclues de ces campagnes, et la biodiversité très riche de ces régions, qui se traduit par un plus grand nombre d'espèces faisant office de réservoir pour le virus de la rage. Il est nécessaire de mettre en œuvre des programmes de sensibilisation axés sur la responsabilité du propriétaire, lequel doit clairement s'engager à fournir une bonne qualité de vie à l'animal domestique qu'il s'apprête à acquérir. Les nouvelles technologies mises en œuvre dans les pays industrialisés ne rencontrent pas toujours le même succès dans les pays moins développés. Les méthodes employées doivent être adaptées aux conditions particulières de chaque pays et prendre en compte ses problématiques culturelles et socio-économiques. Les autorités doivent promouvoir la recherche sur la dynamique des populations de chiens, sur le développement de méthodes non invasives pour contrôler toutes les populations de chiens et sur les meilleures solutions pour assurer une vaccination plus efficace, plus durable et à moindre coût. Dans le cadre du concept « Une seule santé » il est à espérer que les autorités chargées de la santé publique, les organisations internationales et les bailleurs de fond accorderont une priorité élevée à cette zoonose qu'est la rage humaine transmise par le chien, et qu'ils soutiendront le objectifs ambitieux d'éradication fixés en particulier en Asie du Sud-Est. Lorsqu'ils sont bien conçus et financés, les programmes de vaccination basés sur les recommandations de l'Organisation

mondiale de la santé animale (OIE) présentent de grands avantages pour le bien-être animal, parce qu'ils entraînent l'utilisation de meilleurs vaccins (en termes d'efficacité, de durée d'immunité, de facilité d'administration et de coût), une meilleure gestion des populations de chiens et la généralisation de la mise en œuvre des recommandations de l'OIE relatives au contrôle des populations de chiens errants. Les avantages pour le bien-être animal ne se limitent pas à la suppression de la douleur et des souffrances causées par la maladie clinique ; il s'agit également d'éviter les effets indirects du recours à des méthodes non approuvées par l'OIE, lorsqu'elles se traduisent par l'abattage d'animaux dans des conditions qui ne sont pas exemptes de cruauté.

**Mots-clés**

Bien-être animal – Canidés – Chiens – Pays en développement – Rage – Rage canine – Vaccination.



## Principales características del control de la rabia canina en los países en desarrollo y repercusiones en materia de bienestar animal

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**Resumen**

Más del 90% de las muertes humanas por rabia que se producen en el mundo tienen por causa la mordedura de un perro. En los países industrializados se han empleado con éxito las vacunaciones masivas, aunadas a un control eficaz de las poblaciones caninas, para controlar la enfermedad. El menor índice de éxito obtenido en los países en desarrollo se explica por diversos factores, en particular el hecho de que las campañas de vacunación no lleguen a un número suficiente de animales ni a todas las comunidades, junto con la existencia de una gran diversidad biológica que incrementa el número de reservorios del virus. Se necesitan programas pedagógicos que hagan hincapié en el compromiso que supone la adquisición de un animal doméstico y en los requisitos para proporcionarle una buena calidad de vida. Las nuevas tecnologías, surgidas en el mundo industrializado, no siempre serán eficaces en países menos desarrollados. Es preciso adaptar los métodos a las condiciones particulares de cada país, teniendo en cuenta sus características culturales y socioeconómicas. Las autoridades deben promover la investigación sobre las dinámicas de las poblaciones caninas, la concepción de métodos no invasivos para controlar esas poblaciones y la aplicación de las soluciones de vacunación más eficaces, estables y baratas. Cabe esperar que los organismos de salud humana de los países, las autoridades internacionales y los organismos donantes, ateniéndose al modelo de «Una sola salud», otorguen elevada prioridad a la zoonosis que constituye la rabia humana transmitida por perros y secunden así los ambiciosos objetivos de erradicación que se están definiendo, especialmente en el Sudeste asiático. La implantación de programas de vacunación bien concebidos, dotados con recursos suficientes y basados en las recomendaciones de la Organización Mundial de Sanidad Animal (OIE) traerá consigo importantes beneficios de bienestar animal, gracias a la existencia de mejores vacunas (en cuanto a

eficacia, duración de la inmunidad, facilidad de administración y menores costos), a los avances en la gestión de las poblaciones caninas y a una aplicación más extendida de las recomendaciones de la OIE relativas al control de las poblaciones de perros vagabundos. Por «beneficios de bienestar animal» se entiende no solo la eliminación del dolor y el sufrimiento causados por la propia enfermedad, sino también la desaparición de los efectos indirectos que entraña la aplicación de métodos cruentos de sacrificio, no aprobados por la OIE.

#### Palabras clave

Bienestar animal – Canino – País en desarrollo – Perros – Rabia – Rabia canina – Vacunación.



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