RABIES IN FLORES, INDONESIA: COMPARISONS AND CONTRASTS TO RABIES CONTROL IN AFRICA.

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ABSTRACT.

Rabies was introduced to the island of Flores (East Nusa Tenggara Province, Indonesia) in 1997, by a dog transported from Buton Island to the eastern extremity of Flores. The disease subsequently spread westwards to affect the whole island, with the domestic dog being the principal host species. Rabies control was attempted almost entirely through dog population reduction, which was carried out by the communities under the encouragement and lobbying by community and religious leaders. Dog depopulation policies, as opposed to vaccination, were considered necessary because the absence of sufficient veterinary infrastructure required that control efforts had to be conducted by the communities, and not by a government authority. In contrast to the situation in Africa, rabies is likely to be easier to eradicate in Flores because it is an island with a limited and isolated dog population. Like most African countries Flores has poorly developed infrastructure to carry out rabies vaccination campaigns. For this reason it mobilised its communities into taking a very active role in the rabies eradication campaigns. This level of community participation (but not necessarily the techniques used) may be a model for rabies control programmes in Africa.

1 BACKGROUND.

In November 2000 I travelled to Indonesia, at the request of the Indonesian Government and the Office International des Epizooties to investigate an outbreak of canine rabies on the island of Flores and to make recommendations regarding its control. It was not only an interesting epidemiological study but also a study of an unfashionable method of dealing with a new rabies epidemic. The methods used by the government of Flores highlighted principles of rabies control that are often neglected by other governments around the world.

Indonesia is a large archipelago comprising several thousand islands located in Southeast Asia. It has a human population of over 200 million making it the fourth most populous nation in the world. Most of the population is Muslim although the island of Flores is predominantly Christian. Flores is located at around latitude 8° south. It is mountainous throughout its length, with peaks rising to over 2000m. It has a population of just over 1.56 million people, who live mainly around the coastal areas. The principal economic activities are agricultural. The road network is sparse due to the mountainous terrain, although the existing main roads are well maintained. Many of the more out-lying areas are accessible only on foot or with high-clearance vehicles, motorbikes or horses.

2 RABIES IN INDONESIA AND FLORES.

Rabies was first reported in Indonesia during the nineteenth century, but has remained confined to the larger islands of the west and north of the Indonesian archipelago. The domestic dog is the principal maintenance host in all areas of the country.

Rabies had never been reported from Flores or the other islands of southern and eastern Asia until 1997. In November 1997 cases suspicious of rabies in dogs and humans were reported in the eastern

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district of Flores (Flores Timur). The introduction of the disease was traced to a dog that had been transported by boat from Buton Island to the north of Flores in September 1997. From Flores Timur the disease spread to the neighbouring districts in 1999 and continued westwards in 2000. It reached the western-most district in late 2000.

Human rabies cases in Flores were recognised soon after the introduction of rabies in Flores Timur and up until November 2000 ninety-one human cases were reported.

The principle host species for rabies in Flores was, and continues to be, the domestic dog. Before the dog elimination campaigns Flores had a high dog population. There were estimated to be over 600000 dogs, with an average human-to-dog ratio of 2.5:1. Dogs are an important part of Flores society: dog meat being a major ceremonial dish, and dogs being used as currency for bride prices. They are used for hunting wild game and for protecting crops from pests. There does not appear to be a population of unowned dogs in Flores.

In all except the most recently affected district the major control method consisted of dog population reduction (Table 1), implemented soon after the detection of cases in the respective areas. The district of Manggarai, which has only recently confirmed dog cases and which has a large dog population, has started rabies control through vaccination.

### Table 1: Data on control measures in Flores up until October 2000. Dog population estimates were calculated before the control measures were carried out.

<table>
<thead>
<tr>
<th>District</th>
<th>Flores timur/ Lembata</th>
<th>Sikka</th>
<th>Ende</th>
<th>Ngada</th>
<th>Manggarai</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated dog population</td>
<td>119919</td>
<td>125311</td>
<td>69916</td>
<td>86823</td>
<td>234046</td>
<td>636015</td>
</tr>
<tr>
<td>Number of dogs killed: Total</td>
<td>90524</td>
<td>110427</td>
<td>27166</td>
<td>53317</td>
<td>1123</td>
<td>282557</td>
</tr>
<tr>
<td>Culling percent (percent of original population)</td>
<td>75.5 %</td>
<td>88.1 %</td>
<td>38.9 %</td>
<td>61.4 %</td>
<td>0.5 %</td>
<td>44.4 %</td>
</tr>
<tr>
<td>Number of dogs vaccinated</td>
<td>0</td>
<td>0</td>
<td>33208</td>
<td>0</td>
<td>6500</td>
<td>39708</td>
</tr>
</tbody>
</table>

Culling of dogs was done mainly by the individual dog owners, but also by the Livestock Services and Police. No dogs were killed without the consent of the owner. All leadership hierarchies were consulted before the communities were asked to kill their dogs. Usually, a senior leader in the district administration led the teams, which also consisted of a livestock officer and a member of the police force. The community was informed regarding the campaigns and encouraged to participate constructively through messages via community and religious leaders.

The culling policies were extremely unpopular with the community, although resistance has been surprisingly low and co-operation good. The local and international press, the local veterinary association and international animal welfare organisations have been critical of the policies. The critical statements in the press and their contradiction of official policy have caused a great deal of confusion among the public. Some dog owners have refused to have their dogs killed. It was said that dogs were being hidden from the authorities inside houses and in the plantations. It was also stated that people may have been moving their dogs to other districts and even other islands where dog elimination policies were not enforced, in order to protect their dogs.

The effects of the dog elimination policies were evident where they had been conducted rigorously. No dogs were observed while travelling through Ngada District, although they were commonly seen along the roadside and in yards in other areas of the island.

Vaccination policies were not adopted by the districts for a combination of reasons, which were stated as follows:

- Initially rabies vaccines were not available in sufficient quantities; even three years after the start of the epidemic there was insufficient vaccine, despite donations of 146000 doses of animal vaccine. There were insufficient funds to purchase the additional required number of vaccine doses.
- As many of the dogs are not accustomed to being handled, they are difficult to catch.
The lack of any form of transport and deficiencies of refrigeration facilities make the maintenance of cold chains for vaccine difficult.

There are insufficient personnel with the training to vaccinate the dogs.

One acknowledged drawback of the depopulation policies is the possible increase in unauthorised dog movements, particularly to other islands in the region. There is a large amount of boat traffic between islands, which is largely not policed, although legislation does exist to control the movement of animals between islands.

There are several reasons why eradication of rabies from Flores is achievable. Firstly, Flores is a small island and is therefore protected from the large-scale replacement of dogs from surrounding areas. Secondly, the dog population is relatively small in size, which will limit its ability to support a persistent rabies cycle. Finally, there is considerable community will within the island to eradicate the disease.

3 SOME COMPARISONS BETWEEN FLORES AND AFRICA.

The epidemiology of rabies is similar between Flores and much of Africa as the vector in both is the domestic dog, with negligible numbers of unowned dogs. In controlling rabies Flores has many logistical problems similar to those found in Africa. There is insufficient vaccine and insufficient infrastructure to deliver vaccine to target dog populations.

A large continent such as Africa would have considerably more difficulty in eradicating rabies. Flores is an island with an isolated dog population. Movement of dogs onto the island is logistically difficult and therefore it is protected from large-scale dog influx. This protects the dog population from repeated introductions of rabies from other infected populations and also limits the rate at which the dog population can recover following depopulation measures. Rabies eradication through dog depopulation measures alone can conceivably be effective on Flores, but is unlikely to be effective in a continent with the size and population of Africa.

The control effort in Flores gives an example of a community-driven alternative rabies control concept that is rarely found in Africa. Although the local government of Flores played a key role in co-ordinating and monitoring the control efforts, the government itself did not implement the control procedures as it realized that this would have been beyond its ability. In contrast, rabies control in Africa has always been a government initiative, even when governments have become unable to adequately fulfil this role, due to unavailability of resources. Communities have usually been enrolled to assist in control efforts, for example, by bringing their dogs to central vaccination points, but are generally not expected to take greater initiatives in rabies control. More involved community participation in the planning and implementation of rabies control programmes is essential to achieving a more sustained and effective decline in rabies prevalence in Africa.

How can African communities effectively eliminate rabies in their dog populations? The answer is complex and will vary between different communities, but will always depend on strong and dynamic community leadership and effective local leadership structures, as was present in Flores. Governments veterinary departments and Non-Governmental Organisations must always continue to have important roles, including co-ordination of control strategies, maintenance of effective surveillance systems, ensuring that public awareness of rabies (generally as well as the immediate local situation) remains high and ensuring that bottlenecks for the distribution of vaccine into problems areas are removed. Incidentally, these roles can also benefit other areas, for example, improvement of general disease surveillance networks and raising the public awareness of other diseases.

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REFERENCE.