

# Foot and mouth disease in the Lao People's Democratic Republic: II. Seroprevalence estimates, using structured surveillance and surveys of abattoirs

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## Summary

An examination of the seroprevalence of foot and mouth disease (FMD) virus was conducted in the Lao People's Democratic Republic (Lao PDR) from 1996 to 2005, using structured surveillance and abattoir-based studies.

Under structured surveillance, seropositivity ranged from 65.7% (Vientiane Capital, 1996) to 3% (Houaphan, 2005) for cattle and buffalo; and from 2.8% (Vientiane Capital, 1998) to 0% in separate studies of pigs. In each study, species composition was significantly associated with seroprevalence rates.

For abattoir surveys, the majority of samples (60.5%) came from Vientiane Capital (33.0%), Savannakhet (14.0%) and Champasak (13.5%) provinces. The overall proportion of animals testing positive for the presence of antibodies against the FMD virus was 18.7% (ranging from 50.8% in Vientiane Province to 1% in Phongsali). Generally, antibodies against serotype O were the most prevalent.

Cattle and buffalo that tested as seropositive were significantly older than the seronegative animals ( $p < 0.00005$ ). The overall proportional seropositivity was significantly different for different species, as was the case with the antibodies against serotypes O, A and Asia 1. Some 22% of cattle, 55% of buffalo and 23% of pigs demonstrated seropositivity but this varied significantly between provinces.

## Keywords

Asia – Bovines – Buffalo – Cattle – Foot and mouth disease – Lao People's Democratic Republic – Pigs – Prevalence – Serology – Swine.

## Introduction

Foot and mouth disease (FMD) virus is a member of the genus *Aphthovirus*, family Picornaviridae (11) and is the causative agent of foot and mouth disease, a highly contagious virus infection of cloven-hoof animals. The

FMD virus (FMDV) is endemic in the Lao People's Democratic Republic (Lao PDR) (6, 9, 11, 12), as it is in the majority of Southeast Asia, causing severe economic losses in commercial and village (12, 13) animal production systems. The Lao PDR shares borders with Thailand, Vietnam, China, Cambodia and Myanmar, and so is a

major thoroughfare for the informal trade in livestock (6, 9, 12).

This study presents the results of structured and abattoir surveys to determine the serological prevalence of antibodies against FMDV in the Lao PDR during the period from 1996 to 2005. These surveys provided a unique opportunity to investigate variations in FMDV seroprevalence over time and in different locations in a developing country, in which FMD is endemic and vaccination is not normally practised.

## Materials and methods

### Structured surveillance method

Structured surveys were conducted in the north (i.e. Louangphrabang, Houaphan), south (Savannakhet, Champasak) and central (Khammouan, Vientiane Capital, Xiangkhoang, Bolikhamxai) provinces during 1996 and 2005 (see Fig. 1; Table I). Three methods of sampling were used:

- two-stage randomised sampling
- single-stage randomised sampling
- fixed-number randomised sampling.



SR: special region

**Fig. 1**  
**Map of the Lao People's Democratic Republic showing provinces and regions**

The two-stage randomised sampling procedure required the randomised selection of villages during the first stage, and animals within selected villages at the second stage, using a random number table. The animals were selected using a sampling frame, constructed from livestock demographics obtained during an interview with all the families in the village who raised livestock. This method offered a flexible approach for making unbiased estimates of serological prevalence with a precision of  $\pm 10\%$ , based on a low-cost design for livestock surveys that had been developed in the Lao PDR and Thailand (5). Sample size calculations were performed using Survey Toolbox version 1.04 software (4), using animal demographic data provided by the National Statistics Office and the Provincial Agriculture and Fisheries Office (PAFO).

The single-stage sampling method used the same approach as the two-stage method described above, but without the randomised selection of villages within a district. The fixed-number method employed a selected number of animals per village (aiming for 20) and the animals to be sampled were randomly selected, using a random number table.

### Abattoir surveillance

Abattoir surveillance was performed in 17 of the 18 (94%) provinces between June 1999 and December 2001. Local PAFO staff were employed to collect samples and additional sample data from animals slaughtered through local abattoirs. Samples were collected on two occasions every month, from all animals processed on the sampling night. Information was collected on species, age, sex and origin, where possible.

### Calculations and statistics

Data analysis was performed using Stata™ Version 8.0 (StataCorp, College Station, Texas, United States of America). The sample serological prevalence was calculated as the proportion of animals testing positive for the presence of antibodies against FMDV in the sampled population. Chi-squared and Kruskal-Wallis analysis was used to determine significant differences ( $p \leq 0.05$ ) in proportional seropositivity and species distribution. The Wilcoxon rank-sum test was used to determine significant differences ( $p \leq 0.05$ ) in median ages from different groups. The *nptrend* command was used in Stata™ to examine for significant trends in temporal prevalence ( $p \leq 0.05$ ), based on the Wilcoxon rank-sum method.

### Foot and mouth disease virus serology

The FMD liquid-phase blocking enzyme-linked immunosorbent assay (ELISA) was used to evaluate the

**Table I**  
**Proportional foot and mouth disease seropositivity for samples collected using structured surveillance methods in the Lao People's Democratic Republic from 1996 to 2005**

Province	Year	Sampling method	Number of animals tested	Number of villages tested	Number of districts tested	Proportion testing positive for antibodies against foot and mouth disease virus					Cattle/buffalo/pigs (%)	
						Overall % of positive villages	Overall % of positive animals	O	A	Asia 1	Sampling ratio	Positivity ratio
Vientiane Capital	1996	FN	548	35	8	97.1	65.7	29.0	8.2	40.0	64/36/0	66/34/0
Louangphrabang	1997	FN	402	19	1	78.9	23.2	16.3	6.1	0.3	11/89/0	3/97/0
Savannakhet	1997	SS	394	18	1	88.9	28.8	20.3	5.2	2.3	22/78/0	35/65/0
Champasak	1997	SS	413	15	1	93.3	44.4	24.6	4.2	12.9	68/32/0	70/30/0
Khammouan	1997	TS	664	39	4	75.0	12.3	8.2	4.5	0.1	30/64/6	35/64/1
Bolikhamxai	1997	TS	448	40	4	82.5	37.3	2.2	3.1	27.4	54/35/11	63/35/2
Vientiane Capital	1998	TS	302	51	9	0	0	0	0	0	0/0/100	0/0/0
Vientiane Capital	1999	TS	72	6	1	16.6	2.8	0	1.4	1.4	0/0/100	0/0/3
Savannakhet	1999	SS	203	44	4	0	0	0	0	0	0/0/100	0/0/0
Khammouan	1999	SS	68	8	1	0	0	0	0	0	0/0/100	0/0/0
Savannakhet	2003	SS	56	11	2	0	0	0	0	0	0/0/100	0/0/0
Vientiane Capital	2003	SS	45	5	1	20.0	2.2	0	0	2.2	0/0/100	0/0/2
Champasak	2005	SS	432	20	4	100	44.4	27.3	7.6	13.7	70/30/0	70/30/0
Savannakhet	2005	SS	557	27	8	100	26.2	20.6	4.3	2.5	27/73/0	34/66/0
Houaphan	2005	SS	149	8	2	37.5	2.0	0.6	0.6	0.6	23/77/0	33/67/0
Louangphrabang	2005	SS	402	18	4	72.2	22.1	16.7	0.5	0.02	11/89/0	3/97/0
Khammouan	2005	SS	684	38	5	81.5	10.9	7.0	3.9	0.1	31/64/6	33/66/1
Xiangkhoang	2005	SS	411	14	2	92.9	15.8	10.2	7.3	5.6	91/9/0	92/8/0
<b>Total</b>			<b>6,250</b>									

FN: Fixed number randomised

SS: Single stage randomised structured

TS: Two-parameter randomised structured

serological status of all the animals in the surveys. The FMD liquid-phase blocking (LPB) ELISA method is the same as that described previously (8), and employs antigens for the endemic serotypes O (O<sub>1</sub> Manisa), A (A<sub>5</sub>Ailier/A<sub>22</sub>Iraq/ A<sub>24</sub>Cruzeiro) and Asia 1 (Asia 1 Shamir). Reagents were purchased from the Institute of Animal Health, Pirbright, United Kingdom. A titre of  $\geq 1:40$  was considered positive for a particular serotype (7). For the purposes of analysis, a sample was scored positive or negative for a serotype. In cases where there were positive titres to more than one serotype, the serotype giving the highest titre was deemed to be the dominant serotype. In cases where there were two or more equivalently positive titres, all were classed as dominant.

## Results

### Structured surveillance studies

The details of the structured surveillance studies are presented in Table I. The 1997 Bolikhamxai and

Khammouan surveys, and the 1998 and 1999 Vientiane Capital surveys (pigs only), used the two-stage method, with a sample of 12% of the cattle, buffalo and pigs collected in each village. All the remaining surveys used fixed-number randomised animal sampling (aiming for 20 animals per village).

Over all, FMDV seroprevalence ranged from 65.7% (Vientiane Capital, 1996) to 3% (Houaphan, 2005) in cattle and buffalo studies, and from 2.8% (Vientiane Capital, 1999) to 0% in pigs-only studies (Vientiane Capital, 1998; Savannakhet, 1999 and 2003; Khammouan, 1999) (Table I). Interestingly, for the majority of studies, the seropositive animals were not clustered in particular villages, which may have indicated previous outbreaks in those villages. During 1997, animals from southern and central Lao (Champasak, Savannakhet, Khammouan) demonstrated a dominance of type O antibodies. Around the same period (1996 to 1997), the central provinces (Vientiane Capital and Bolikhamxai) demonstrated high rates of type Asia 1 antibodies not seen further south, while Louangphrabang in the north demonstrated a dominance of type O seroprevalence (16%). For the period from 1996

to 2005, the seroprevalence rates for type A remained reasonably constant and generally low (cattle and buffalo samplings never exceeded 9%). The later 2005 studies demonstrated remarkably similar seroprevalence to those conducted in Champasak, Savannakhet and Louangphrabang province in 1997 (Table I).

There were significant differences in the composition of species in the various studies, with six studies exclusively sampling pigs and nine studies exclusively sampling cattle and buffalo. The species composition in each study was significantly associated with differences in seroprevalence (Table II).

### Abattoir surveys

In total, 9,241 samples were received from 17 provinces during the period from 1999 to 2001 (Table II). The majority of samples (60.5%) came from abattoirs in Vientiane Capital (33.0%), Savannakhet (14.0%) and Champasak (13.5%) provinces. Over all, pigs comprised the highest proportion (53%) of samples, followed by buffalo (32%) and cattle (15%), although the composition of these proportions varied significantly by province. The overall median age of the sampled animals was two years

(interquartile range [IQR] 0.1 to 6 years), although this varied significantly (Wilcoxon rank-sum  $p < 0.00005$ ) by species (cattle median 5 years: IQR 4 to 7 years; buffalo median 6 years: IQR 5 to 8 years; pig median 11 months: IQR 0.06 to 1 year) (Table III).

The overall FMDV seroprevalence in abattoir-sampled animals was 18.7% (Table II), ranging from 50.8% in Vientiane Province to 1% in Phongsali. Other provinces with high seroprevalence rates were Khammouan (29.0%), Savannakhet (27.7%) and Vientiane Capital (23.2%). Generally, type O antibodies were the most prevalent (11.1%) (Table II). Some 22% of cattle, 55% of buffalo and 23% of pigs demonstrated seropositivity (Table II), but this varied significantly between provinces (Chi-squared  $p < 0.00005$ ).

With the exception of livestock killed in Vientiane Capital, the majority of animals slaughtered at a provincial abattoir also originated from that same province. The Vientiane Capital abattoir received 2,506 animals (83.4% of the provincial total) from 11 external provinces, as well as two animals from Thailand. The majority of these animals were pigs (Khammouan  $n = 684$  [27.3%] and Bolikhamxai  $n = 225$  [9.0%]) and buffalo (Louangphrabang  $n = 453$  [18.1%]) (Fig. 2).

**Table II**  
**Proportional foot and mouth disease seropositivity for samples collected from provincial abattoirs in the Lao People's Democratic Republic from 1999 to 2001**

Province	Number of samples	Median age (IQR) <sup>(a)</sup>	Proportion testing positive for antibodies against foot and mouth disease virus				Cattle/buffalo/pigs (%)	
			Animals	O	A	Asia 1	Sampling ratio	Positivity ratio
Attapu	254	0.6 (0.1-5)	9.5	5.5	3.9	2.0	7/25/68	12/79/9
Bokeo	159	2 (0.05-5)	1.9	0.6	0	1.3	5/31/64	0/67/33
Bolikhamxai	372	0.08 (0.05-0.6)	1.6	0.8	0.5	0.3	0/3/97	0/17/83
Champasak	1,246	4 (0.95-6)	11.1	5.6	4.6	4.3	26/27/47	51/43/6
Houaphan	77	4 (1-5)	2.6	1.3	1.3	0	17/60/23	0/100/0
Khammouan	428	5 (0.2-8)	29.0	19.4	14.0	10.5	16/42/42	19/75/6
Louangnamtha	198	1 (0.08-1)	11.1	3.0	7.6	7.1	2/20/78	9/59/32
Louangphrabang	179	6 (4-8)	7.3	2.8	3.9	2.2	18/58/24	38/54/8
Oudomxai	182	2 (2-3)	9.9	0	3.9	8.2	11/9/80	28/11/61
Phongsali	97	5 (2-7)	1.0	0	1.0	0	13/44/43	0/100/0
Salavan	293	3 (2-4)	6.8	5.5	1.4	0.7	14/18/68	10/75/15
Savannakhet	1,298	0.7 (0.08-7)	27.7	21.8	8.6	10.0	14/18/68	30/37/33
Xekong	211	2 (1-4)	5.7	1.4	4.3	1.0	10/29/61	25/50/25
Vientiane Province	433	6 (4-9)	50.8	31.0	24.0	19.7	16/67/17	21/78/1
Vientiane Capital	3,045	4 (0.06-6)	23.2	12.4	8.4	10.5	12/43/45	12/57/31
Xaignabouli	361	0.1 (0.08-2)	4.7	3.3	1.1	0.6	2/19/79	18/59/23
Xiangkhoang	408	2 (1-3)	10.1	3.7	5.4	6.6	8/14/78	66/10/24
<b>Total</b>	<b>9,241</b>	<b>2 (0.1-6)</b>	<b>18.7</b>	<b>11.1</b>	<b>7.3</b>	<b>7.7</b>	<b>15/32/53</b> <sup>(a)</sup>	<b>22/55/23</b> <sup>(a)</sup>

IQR: interquartile range

a) Chi-squared  $p < 0.00005$

**Table III**  
**The influence of species and sampling method on foot and mouth disease seropositivity**

Species	Type of study	Number of samples (%)	Median age of sampled animals (IQR)	Median age of positive animals (IQR)	Proportion testing seropositive for FMD			
					Overall	O	A	Asia 1
Cattle		1,405 (15.3)	5 (4-7)	6 (5-7) <sup>(a)</sup>	26.5 <sup>(b)</sup>	15.9 <sup>(b)</sup>	12.1 <sup>(b)</sup>	9.9 <sup>(b)</sup>
Buffalo	Abattoir-based	2,937 (32.0)	6 (5-8)	7 (5-9) <sup>(a)</sup>	32.2	21.0	11.3	13.4
Pigs		4,851 (52.7)	0.11 (0.06-1)	0.07 (0.04-0.5) <sup>(a)</sup>	8.2	3.2	3.8	4.5
<b>Total</b>		<b>9,193<sup>(c)</sup></b>	<b>2 (0.1-6)</b>	<b>6 (3-8)<sup>(a)</sup></b>	<b>18.8</b>	<b>11.1</b>	<b>7.7</b>	<b>7.7</b>
Cattle	Structured or	2,436 (39.0)	NA	NA	35.6	16.7	5.0	13.9
Buffalo	semi-structured	3,058 (48.9)	NA	NA	24.2	13.8	3.8	6.7
Pigs	surveillance	766 (12.1)	NA	NA	0.09	0	0.04	0.04
<b>Total</b>		<b>6,260</b>			<b>25.9</b>	<b>13.3</b>	<b>3.9</b>	<b>17.4</b>

FMD: foot and mouth disease

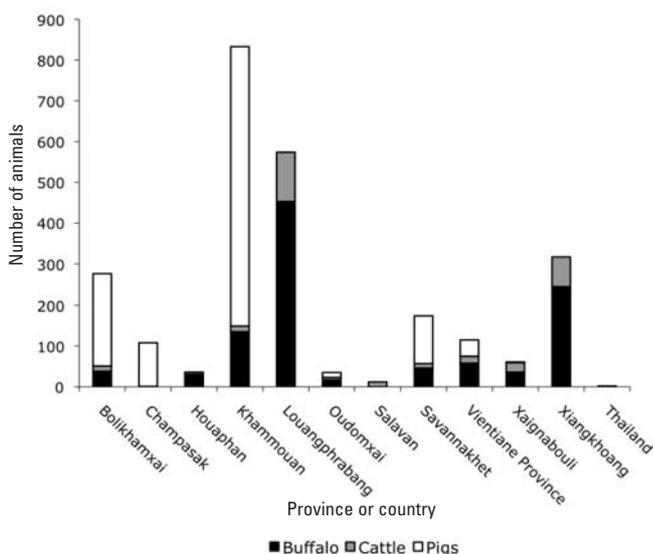
IQR: interquartile range

NA: not applicable

a) Wilcoxon rank-sum  $p < 0.00005$

b) Chi-squared  $p < 0.00005$

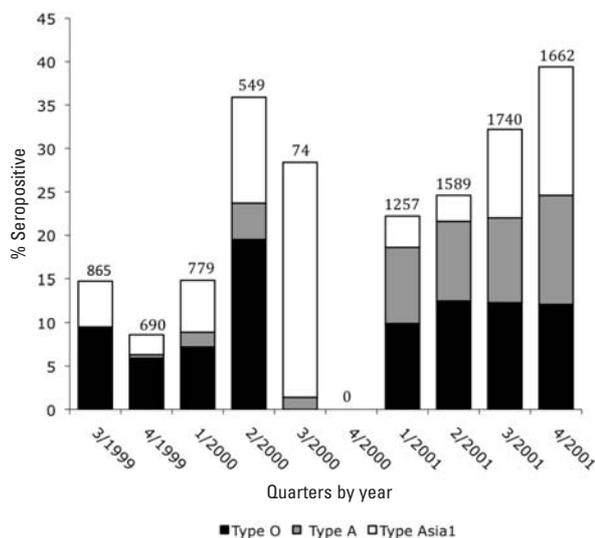
c) Where species known



**Fig. 2**  
**The proportion of buffalo, cattle and pigs arriving at the provincial abattoir in Vientiane Capital for slaughter from other regions during 1999 and 2001**

Among the animals sampled in the abattoirs, the seropositive cattle and buffalo were significantly older than seronegative animals (Wilcoxon rank-sum  $p < 0.00005$ ) (Table III). The overall proportional seropositivity was significantly different for different species, as was the case with the antibodies against serotypes O, A and Asia 1 (Chi-squared  $p < 0.00005$ ).

Foot and mouth disease seropositivity was examined at intervals of three months (or ‘quarters’ of the year) (Fig. 3). Quarterly seroprevalence ranged from 0% to 19.5% (type O: 0% to 19.5%; A: 0.2% to 12.5%; Asia 1: 2.3% to 14.8%), and there were significant changes in seroprevalence (Chi-squared  $p < 0.00005$ ) for all serotypes over these periods.



**Fig. 3**  
**The seroprevalence of foot and mouth disease virus in provincial abattoir samples in the Lao People's Democratic Republic, shown quarterly from 1999 to 2001**

Note that no samples were collected in the fourth quarter of 2000. Numbers on top of the bars represent the number of animals sampled per quarter

## Discussion

This is the first study to examine the seroprevalence rates of antibodies against FMDV in the Lao PDR, and demonstrates the usefulness of structured surveillance and collecting samples from abattoirs.

Over all, there was a dominance of serotype O antibodies in cattle and buffalo in most of the provinces surveyed. These results reflect the circulation of the Southeast Asian and pan-Asian serotype O viruses which were endemic in the southern and central regions of the Lao PDR in the late

1990s (10, 12), and were probably introduced by animal movements from neighbouring countries (6, 12). Significant serotype Asia 1 seroprevalence in the central region of Vientiane Capital and Bolikhamxai in 1996 and 1997 was probably caused by a large FMD outbreak in that region in late 1996, which was subsequently confirmed to be due to serotype Asia 1 (6, 9). In Louangphrabang, in the northern Lao PDR, surveys in 1997 and 2005 demonstrated a dominance of serotype O antibodies, with few or no serotype A or Asia 1 antibodies.

There were no FMD outbreaks reported from 1998 to 2002, but serotype O was reported in 2003, 2004 and 2005. Seroprevalence data from 1997 suggest the occurrence of a recent unreported outbreak of serotype O in Louangphrabang Province. The prevalence of serotype A antibodies varied across the provinces, which is of interest, since no serotype A outbreaks were reported during the survey period. However, major serotype A outbreaks occurred in Vientiane Capital in 2006 (9). Explanations for the presence of antibodies against serotype A (and Asia 1) in the absence of overt disease include:

- vaccination with bivalent (O and Asia 1) vaccines during emergency control programmes (9)
- the use of trivalent (O, A and Asia 1) FMD vaccines produced in Thailand on commercial farms
- vaccinated animals imported from a country where vaccination is normally practised.

Other possible reasons could include unrecognised outbreaks of serotype A (or Asia 1), causing residual antibodies in animals which recovered, as well as antigenic cross-reactivity in the FMD LPB-ELISA and/or FMDV-positive carrier status (discussed below).

Whereas the overall FMDV seropositivity results were similar for structured and abattoir surveys, the composition of the species being sampled at the abattoirs was quite different. The majority of animals (> 50%) sampled at the abattoirs were pigs. It is notable that village pigs from structured surveys demonstrated very low levels of FMDV seroprevalence, compared with the pigs sampled at the abattoirs, which demonstrated somewhat higher antibody levels. This may be due to a number of factors, including the importing of weaner pigs from Thailand by semi-commercial farms for fattening. As FMD vaccination is common in the commercial pig sector in Thailand (6), it is possible that the imported piglets may have been vaccinated before entering the Lao PDR, or the farmers may have bought Thai vaccine when they purchased the pigs. It would appear that smallholder pig producers in the Lao PDR do not normally vaccinate against FMD. The exception is a vaccination buffer zone created through the southern Lao PDR in 1999, following serotype O pan-Asia toptotype outbreaks in Champasak and Savannakhet and

emergency ring vaccination in Xiangkhoang Province in 2002. It is possible that this vaccination programme may have influenced the seroprevalence results from cattle and buffalo at that time. A detailed description of this vaccination campaign can be found elsewhere (9). Over all, there were statistically significant trends in the quarterly seroprevalence for the FMDV serotypes. However, the reasons for these differences are not immediately clear.

One significant observation from the abattoir studies was that animals travelled many hundreds of kilometres to Vientiane Capital for slaughter. This significant movement of animals increases the opportunity for dispersal of the disease by infected livestock. It was also notable that the majority of the animals transported to Vientiane Capital were pigs. This is likely to be caused by economic forces, such as increased access to markets and increased pork prices.

One limitation on this and other FMDV serology studies is the level of cross-reaction among FMDV serotypes in the LPB-ELISA. It is difficult to ascertain if this multiple serotype positivity is due to cross-reaction (8, 17) or caused by previous exposure to multiple FMDV serotypes. Furthermore, it is well established that cattle may become carriers of FMDV after exposure to the virus, and that this carrier status may last for months (14, 15, 16). The FMDV carrier status of the Asiatic buffalo has not been established. However, the African buffalo is known to be a carrier of FMDV following infection and to perpetuate the infection cycle among other susceptible animals (1, 2). Pigs are not considered to be carriers of FMDV.

Again, the high prevalence of FMDV antibodies in cattle and buffalo raises a question as to the cause of the seropositivity. Is it due to a previous infection or to a continuing active infection? Since animal vaccination is not normally practised in the Lao PDR, immunity can only be explained by residual antibodies after infection or an ongoing carrier state. As large numbers of buffalo are used in agriculture in the Lao PDR, and in other FMD-endemic areas, studies to establish the carrier status of the Asiatic buffalo are crucial.

Another factor that affects FMDV serology studies is the antigenic relationship between the FMDV strains that cause disease and the strains used in the FMD LPB ELISA. The reagents for the LPB ELISA were provided by the FMD World Reference Laboratory at Pirbright. If the strains causing disease in the Lao PDR are significantly antigenically heterogeneous from those included in the ELISA, then serological titres will not truly represent the serological status of the animals. Future antigen comparison studies are required to determine the most appropriate antigens for inclusion in FMD LPB ELISA to be used in the Lao PDR.

The many studies summarised here clearly demonstrate the usefulness of FMDV serosurveillance. However, simple tools designed specifically to detect active infection would greatly aid the control of FMD in endemic settings. Three sampling methods were used over the course of these studies and, despite an intention to use two-stage randomised sampling, this method was only employed in four surveys. Single-stage randomised and fixed-number randomised sampling methods were used for the remaining studies because of logistical constraints, such as inaccessibility of villages and lack of funds. Continued surveillance for both FMD infection and the presence of antibodies against FMDV in livestock will greatly assist the decisions required for the future control of the disease. ■

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## Fièvre aphteuse en République démocratique populaire lao : II. Estimation de la prévalence sérologique par une surveillance structurée et des enquêtes dans les abattoirs

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### Résumé

Une estimation de la prévalence sérologique du virus de la fièvre aphteuse a été réalisée en République démocratique populaire lao de 1996 à 2005, en utilisant les résultats d'une surveillance structurée et d'enquêtes dans les abattoirs.

Les résultats de la surveillance structurée exercée chez les bovins et les buffles révèlent un taux de séropositivité allant de 3 % (Houaphan, 2005) à 65,7 % (capitale de Vientiane, 1996) ; des enquêtes indépendantes conduites chez les porcs révèlent des taux de séropositivité allant de 0 % à 2,8 % (capitale de Vientiane, 1998). Dans chaque enquête, on constate une forte corrélation entre les espèces faisant l'objet de l'enquête et les taux de prévalence sérologique.

Lors des enquêtes dans les abattoirs, la plupart des échantillons (60,5 %) provenaient de la ville de Vientiane (33,0 %) et des provinces de Savannakhet (14,0 %) et de Champasack (13,5 %). Le taux global d'animaux possédant des anticorps contre le virus de la fièvre aphteuse était de 18,7 % (avec des variations allant de 1 % à Phongsali à 50,8 % dans la province de Vientiane). En règle générale, le taux de prévalence le plus élevé était celui des anticorps dirigés contre le sérotype O.

Les bovins et les buffles séropositifs étaient significativement plus âgés que ceux qui ne possédaient pas d'anticorps ( $p < 0.00005$ ). Le taux global et le taux par sérotype (O, A et Asia 1) ont présenté des variations significatives suivant l'espèce; 22 % de bovins, 55 % de buffles et 23 % de porcs possédaient des anticorps avec des variations suivant les provinces.

### Mots-clés

Asie – Bovidé – Bovin – Buffle – Fièvre aphteuse – Porc – Prévalence – République démocratique populaire lao – Sérologie – Suidé.

■

## La fiebre aftosa en la República Democrática Popular Lao. II. Cálculo de la seroprevalencia mediante una vigilancia estructurada y análisis en mataderos

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### Resumen

Entre 1996 y 2005 se estudió la seroprevalencia del virus de la fiebre aftosa en la República Democrática Popular Lao, utilizando para ello una vigilancia estructurada y análisis realizados en mataderos.

Según la información obtenida con la vigilancia estructurada, la seropositividad osciló entre un 65,7% (Vientiane Capital, 1996) y un 3% (Houaphan, 2005) en ganado vacuno y búfalos, y entre un 2,8% (Vientiane Capital, 1998) y un 0% en los cerdos, analizados por separado. Todos los estudios revelaron una correlación significativa entre la composición de la especie y los índices de seroprevalencia. Por lo que respecta a los análisis realizados en mataderos, la mayoría de las muestras (60,5%) provenían de las provincias de Vientiane Capital (33,0%), Savannakhet (14,0%) y Champasack (13,5%). El porcentaje global de animales que resultaron positivos a la presencia de anticuerpos contra el virus fue del 18,7% (desde un 50,8% en la provincia de Vientiane hasta un 1% en Phongsali). En términos generales, los anticuerpos contra el serotipo O eran los más prevalentes.

Los vacunos y búfalos positivos eran de edad significativamente mayor que los animales seronegativos ( $p < 0,00005$ ). Tanto el porcentaje global como el porcentaje de seropositividad por serotipo (O, A y Asia 1) diferían significativamente en las distintas especies; un 22% de los vacunos, un 55% de los búfalos y un 23% de los cerdos resultaron seropositivos, con variaciones entre provincias.

### Palabras clave

Asia – Bovinos – Búfalo – Cerdo – Fiebre aftosa – Ganado vacuno – Porcino – Prevalencia – República Democrática Popular Lao – Serología.



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