Cost-benefit analysis of mass vaccination campaign against H5N1 in small scale production systems in Vietnam.

Part I: Economical results in Long An province.

T. Phan Dang[1], S. Desvaux[2], T.Vu Dinh[1], J.F. Renard[3], F. Roger[3], M. Peyre[3]

1. Centre for interdisciplinary research on rural development (CIRRD), Hanoï agricultural university, Hanoï, Vietnam
2. French Agricultural Research Center for International development (CIRAD), PRISE Consortium in Vietnam, National Institute of Veterinary Research, Hanoï, Vietnam
3. CIRAD, F-34398 Montpellier, France

Introduction

Highly Pathogenic Avian Influenza (HPAI) caused by H5N1 virus has become endemic in some developing countries and millions of birds have been culled with large economical and sociological impacts. Since the end of the first vaccination campaign in Vietnam limited outbreaks in non-vaccinated domestic poultry have been reported. However, the virus is still circulating as confirmed by routine surveillance programs. Vaccination is a useful tool to be used to eradicate the disease, but the cost-benefit impact of different strategy needs first to be addressed at local level, where implementation is decided. The aim of this study was to evaluate the cost-benefit impact of Vietnam mass vaccination program at local level. This poster presents the first step in the cost-benefit analysis: the partial economical analysis of the vaccination within Vietnam provinces. Only the results in Long An province (South) are presented here.

Material and Methods

The small scale production sectors (3 and 4) are at high risk for infection with minimal to low level of biosecurity and where mass vaccination against HPAI is the most difficult to implement and to monitor. Data were collected by interviewing sector 3 and 4 farmers in Long An province, South Vietnam.
The costs and benefits were evaluated at farm level (farm sample size= 64); different value between species (chicken and ducks) and production type (meat birds, layers, breeders) due to different breeding times, selling weights and selling prices, were accounted for in the calculations. The results were presented as Present Value (Benefits minus Costs) in local currency for The results were presented as Present Value (Benefits minus Costs) in local currency per 1000 heads; and as Benefits/Costs ratio (BCR).

COSTS	BENEFITS
– Basic costs for vaccinating the herd (vaccine price; administration costs; equipment; training) – Opportunity cost of the time spent by the farmer to vaccinate (or help with the vaccination)	– Value of the protected herd Mean value* x number of birds /production type (meat, layer, breeder) – Saving in the cost of control measures previously used to control the disease: culling (cost of culling the herd minus compensation value for the herd)

*The mean value represents the value of the bird at half time of the breeding period (t(sale)-t(purchase)). Different distribution model were associated to the value of the bird: a logarithmic increase and a linear decrease for meat birds and layers respectively; the final sale price was used for breeders.

Main hypothesis:
- ➥ 100% of the birds in a vaccinated farms are vaccinated
- ➥ Vaccinated flocks can not be infected
- ➥ Values of the flocks are calculated using only the value of the birds (mean value between purchase and sale); the gross margin of the farm is not taken into account here.

Results and Discussion

Farm types

65% of the farms visited are raising both chickens and ducks (mixed farms) (85% for backyard poultry and 60% for commercial); Ducks are bred in majority in the South (Figure 1)

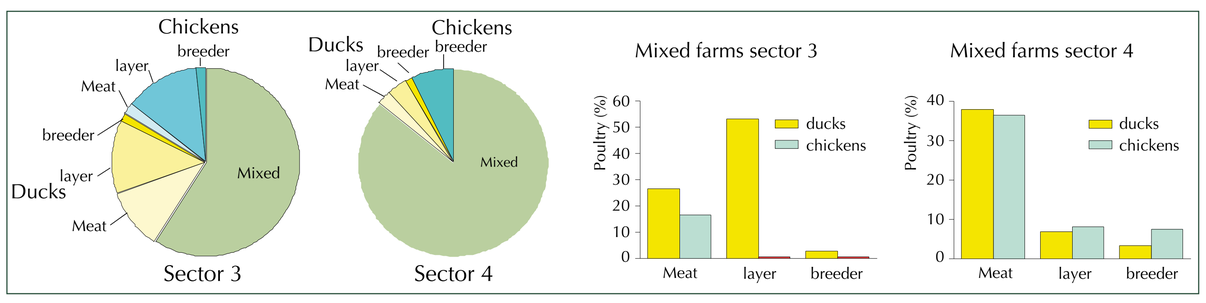

Figure 1. Poultry production types according to the farming systems and production sectors

Farmers' practices facing an infection with HPAI

The majority of the farms in Sector 3 tend to sale culled poultry at low prices (68%) in opposition with sector 4 where consumption of dead or culled poultry is limited (14%) (Table 1). This has not always been the case and it seems that the change in behaviour was greatly influenced by the awareness program on avian influenza performed by the government since 2005: backyard poultry farmers are more aware of protecting their health.

Vaccination versus culling for HPAI control

– Vaccination is more cost effective for the farmer than culling (with BCR between 30 to 80 times more, Table 2). The benefits are significantly lower for backyard farmer than commercial farms (-15%, $p<0.05$) probably due to the lowest value of their flocks.
Note: In this study, the very high benefits to costs ratios obtained are due to the fact that most of the vaccination costs are not covered by the farmers (see Figure 2); production costs are not accounted for in the calculation and punctual calculation was made on the value of the flocks at the time of the interview.
– Vaccination benefits vary according to the farmer attitude facing an outbreak (Tables 1 and 2), compensation represents 20% off the benefits (with long repayment delays: around 6 months) whereas selling the flock at low prices accounts for nearly 50%, awareness campaigns and modification in the compensation scheme could help in changing these practices as done for sector 4.
– Most of the farmers stopped breeding poultry for a long time after the last wave of outbreaks (2004-2005) (between 3 to 24 months), the larger farms (>300 heads) were most affected (12-24 months), smaller farms (<300 heads) stopped breeding for 3 months only. Lack of cash flow and disease occurrence uncertainty could be the main reasons for these delays. These productivity losses should be included in an annualised cost-benefit analysis.

Table 2. Results of the partial budget analysis of the use of vaccination versus culling against HPAI at the farmer level within different scenarios

Scenario		Present Value (PV) Kvnd/1000 heads (sector 3)	Benefits / Costs Ratio (BCR) (95% confidence limits)	Percentage of infected farms (in 2004-2005)
Total culling with declaration to the local veterinarian (with compensation)$	Sector 3	33668	78 (74-82)	12%
	Sector 4	39340	67 (64-70)	72%
Total culling with sales of dead or culled animal at low price (around 50% less)	Sector 3	21819	49 (47-50)*	68%
Total culling with sales of dead or culled animal at low price (around 50% less) and declaration (compensation)	Sector 3	12272	31(28-33)*	8%
Rapid sale of dead or live animals at low prices (or consumption for sector 4)	Sector 3	20956	47 (45-48)*#	4%
	Sector 4	22309	38 (36-39)	14%
Other	Sector 3	-	-	8%

$Compensation =10kvnd/adult; 5kvnd/young
*Statistically significant difference with scenario total culling with compensation ($p<0.05$)
#Statistically significant difference with scenario total culling with sales at low prices ($p<0.05$)

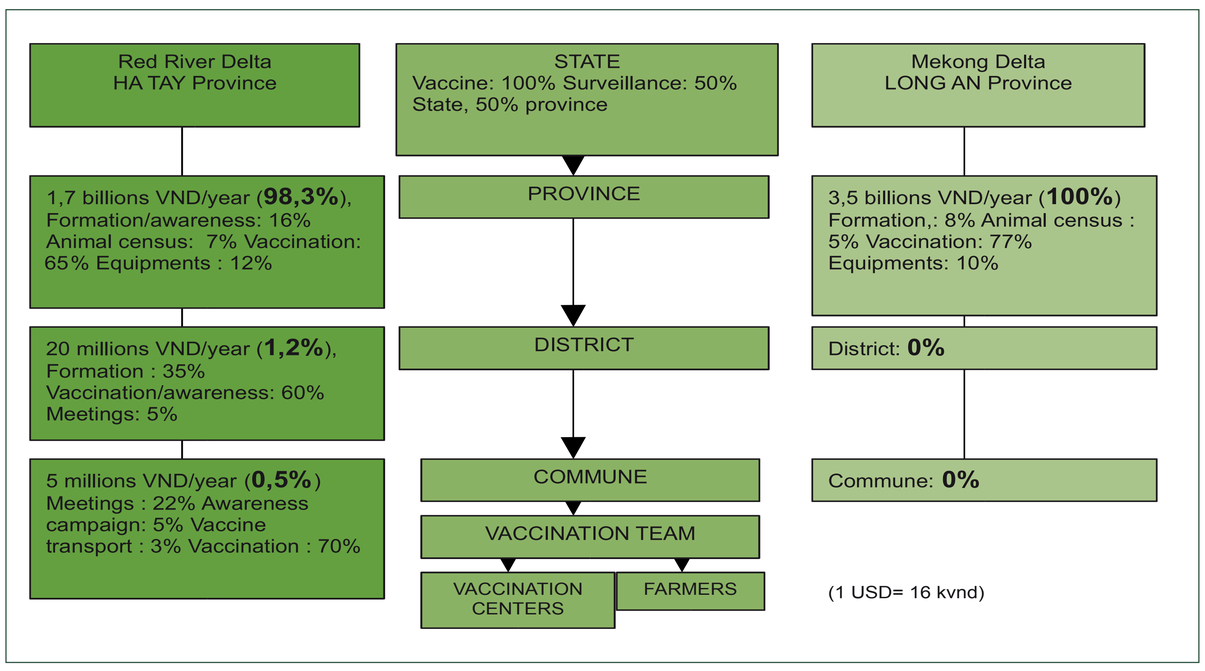

Figure 2. Repartition of the vaccination costs according to the different administrative levels.

Table 1. Farmer practices during an HPAI outbreak (sample size sector 3= 25; sector 4=7).

Practice	Sector 3 %	Sector 4 %
Total culling	64	86
Partial culling (only sick animals)	4	-
Partial culling + treatment	4	-
Treatment	12	-
Confinement	8	-
Rapid sale of live animals	4	-
Consumption or sale of dead animals	68	14
No information	4	-

Sector 3, commercial poultry

Sector 4, backyard poultry

Perspectives

The data presented here give a first insight on the financial repartition of vaccination campaigns and farmer incentives to vaccinate. Preliminary analysis of data from the North shows that differences exist within vaccination policies and farmer practices between provinces (Table 3). Therefore it will be interesting to compare the benefits to costs of the vaccination between provinces. This study represents the first step in the design of a model to evaluate different vaccination strategies against HPAI according to the economic and social context of the country.

Table 3. Differences in the vaccination program between North and South provinces.

Ha Tay (NORTH)	Long An (SOUTH)
– 1 dose/campaign; no vaccination for layers during laying period (losses in productivity) – No additional vaccination campaigns before July 2007 – Since July 2007 every new flock has to be vaccinated – Vaccination at centres for farms with <50 heads – Vaccination at the farm for >50 heads	– 2 doses/campaign (layers, breeders). 1 dose/meat birds <60 days old – Additional vaccination in between campaigns since 2006 – Since July 2007 every new flock has to be vaccinated – Vaccination at the farm for all the farm sizes