

COST OF FOOT-AND-MOUTH DISEASE VACCINATION IN PERU

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SUMMARY

A study was made of the cost of foot-and-mouth disease vaccination in Peru for the third phase of vaccination conducted by the National Foot-and-Mouth Disease Control Program from October 20 to December 20, 1978. The study determined a value of s/33.13 per bovine vaccinated, equivalent to US\$0.17 at the average official exchange rate for the period. The cost of the vaccine accounted for the major portion of the total cost (45% of the total).

INTRODUCTION

An awareness of the cost of applying a dose of foot-and-mouth disease (FMD) vaccine is of great importance to those who are responsible for planning and implementing animal health programs. In addition to providing an indicator for assessing FMD control programs, it also serves as a methodology for programming the measures to control other diseases requiring massive use of vaccines, antigens or medicines.

This study was conducted as part of the Evaluation of the National Foot-and-Mouth Disease Control Program (PNCFA) for the 1977-1979 period.

The PNCFA is the agency responsible for the FMD control and eradication campaign in Peru. It has Technical and Administrative Units at the central level and 13 Regional Offices. The latter offices direct and orient field work including the vaccination. Personnel from the animal health service and PNCFA auxiliary personnel share the task of vaccination. Therefore, two types of personnel take part in FMD vaccination throughout Peru, based on the strategy of selecting pri-

ority areas in which 80% of the cattle over 4 months of age are vaccinated. The vaccination coverage in the rest of Peru is less than 80% of the bovine population. FMD vaccine is used only on the bovine species, except for some cases of perifocal vaccination of pigs. The official service administers approximately 88% of the vaccinations; the rest is administered privately (2).

METHODOLOGY

This evaluation of the cost of FMD vaccination in Peru took into account all the expenses directly or indirectly affecting the final value. For accounting purposes, these expenses are grouped into budgetary elements or "allotments", of which there are ten in the official Peruvian accounting system (4).

The unit cost of vaccination was calculated for a given period of time, i.e., a given phase of vaccination. Inasmuch as cattle in Peru are vaccinated three times a year, this study selected the third phase of vaccination in 1978, which ran from October 20th to December 20th. During that phase, the official service vaccinated 1,025,041 bovines (3).

The following budgetary elements were considered in this study: wages and salaries, goods, services, Peruvian social security assessments, depreciation of material utilized, and vaccine market price (3).

In order to obtain data consistent with the reality, each budgetary element was weighted according to information taken from official PNCFA documents corresponding to the period under study. To facilitate and improve understanding, this study presents the budgetary elements separately as follows:

1. Wages and salaries

PNCFA Personnel. Personnel salaries and wages during the period of vaccination work totalled

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4,889,704 soles. It was estimated that the central level technical and administrative personnel spent 25% of their time on activities related to the work of vaccination during that period. This expenditure amounted to 5,177,439 soles.

Animal Health Personnel. The regional level animal health personnel render support to the FMD vaccination work for varying periods during the vaccination phase. The cost attributed to their participation was calculated on the basis of the number of cattle they themselves vaccinated in relation to the number of bovines vaccinated by PNCFA personnel.

The official personnel vaccinated 1,025,741 head of cattle in the 13 Agrarian Regions into which the nation is divided. Only 12 of those areas provided separate information on the number of cattle vaccinated by PNCFA personnel and by Animal Health personnel. Of a total 970,637 cattle vaccinated (*Table 1*) the PNCFA personnel vaccinated 488,597 head (50.4%) while the Animal Health personnel vaccinated 482,040 head (49.6%). Whereas the salaries and wages paid to the PNCFA personnel amounted to 4,889,704 soles, the vaccinations administered by Animal Health personnel represented 4,831,381 soles. This account therefore totalled 10,008,820 soles.

2. Goods

This account covers outlay on fuel, lubricants, ice, office supplies, replacements and others, considered as short-term consumables.

TABLE 1. *Vaccinations administered by the Official Service. Third phase of FMD vaccination. Peru, October 20 - December 20, 1978.*

Administered by	Vaccinations administered	
	Number	%
PNCFA Personnel ^a	488 597	50.4
Animal Health Personnel	482 040	49.6
Total^a	970 637	100.0
XIth Agrarian Region	55 104	—
Vaccinated by Official Service	1 025 741	—

^a Does not include the XI Agrarian Region - Moyobamba.
Source: PNCFA Regional Office Vaccination Reports.

For the Regional level, this account included the full budget allocated to the PNCFA Regional Offices during the third phase of vaccination. For the central office level, 25% of the expenditures paid out during the two months of vaccination were computed. These expenses amounted to 690,199 soles (*Table 2*).

The Agrarian Regions' disbursements during the phase of vaccination were covered by the PNCFA cash fund and are included in the budget allotted to the PNCFA Regional Offices.

TABLE 2. *Funds applied for the third phase of the vaccination. Peru, October 20 - December 20, 1978.*

Disbursed by/Item	Wages & Salaries	Goods	Services	Others	Total
PNCFA Central Offices	287 735	254 296	485 703	23 019	1 050 743
PNCFA Regional Posts	4 889 704	435 913	832 628	391 173	6 549 418
Animal Health Field level	4 831 381	—	—	384 964	5 216 345
Total	10 008 820	690 199	1 318 331	799 156	12 816 506

Source: PE-PNCFA Administrative Sub-Department.

3. Services

This account includes expenses relating to manpower, vehicle repairs, equipment, travel expenses, per diems, etc., paid out of the funds for cash payments allocated to implementation of the third vaccination stage in 1978. The 25% referring to the expenses incurred by the PNCFA central level in this account was added, bringing the services account to 1,318,331 soles.

4. Social Security Taxes

The assessments paid out for social security purposes were calculated on the same basis as in item 1 above, for the duration of the third phase of FMD vaccination. The total of 799,156 soles includes both the PNCFA and Animal Health personnel who participated in that phase of the campaign.

5. Depreciation of material

This account includes the expenses incurred for the utilization of vehicles, equipment, and other more durable goods classed under the Capital Goods and Goods accounts (Table 3).

The following procedure was followed to calculate the expenditures under this account: (a) listing of the materials directly or indirectly utilized in the vaccination, with their respective quantities expended and prices; (b) estimating the durability (useful life) of each material utilized, based on field experience; (c) dividing the unit price of each material utilized by the number of vaccination phases corresponding to their respective periods of durability or useful lives, which yields the material's cost of use in one foot-and-mouth disease vaccination phase; (d) multiplying the depreciation value thus obtained, by the number of units of the same material utilized in one phase of FMD vaccination.

The depreciation costs of all the materials used in the third phase of vaccination amounted to 5,770,195 soles (Table 4).

6. Vaccine

The market price of FMD vaccine during the third phase of vaccination was 15.00 soles per dose. Since 1,025,041 doses were administered by the official service during the phase

TABLE 3. *Durability (useful life) of materials per vaccination phase. Table of Conversion Time-No. of phases.^a Peru, 1978.*

Years	Duration		Equivalency Vaccination phases
	Years	Months	
—	3	1	
—	6	2	
1	—	3	
2	—	6	
3	—	9	
4	—	12	
5	—	15	
6	—	18	
7	—	21	
8	—	24	
9	—	27	
10	—	30	
15	—	45	

^aThe value of a material's depreciation during a vaccination phase is determined by dividing the unit price by the number of vaccination phases for which it can be used.

reviewed, a total of 15,375,615 soles were spent for vaccine.

RESULTS

The values classified as expenses, depreciation and vaccine amounted to a total of 33,962,316 soles (Table 5). Dividing that total by 1,025,041 doses administered by the official services yields a per-dose value of 33.13 soles for the third phase of vaccination.

It is noteworthy that the costs of vaccine and of manpower accounted for 45% and 29% of the total cost, respectively.

TABLE 4. *Depreciation of the Material Utilized during the FMD Vaccination Campaign.
Third Phase of Vaccination, Peru, 1978.*

Material	Unit price (Soles)	Durability in vaccination phases	Cost per phase of vaccination	Units used	Total cost per phase (Soles)
Coveralls	1 009 80	2	504 90	560	282 744 00
Boots	1 450 00	3	483 34	560	270 670 40
Motorcycle helmets	2 415 00	12	201 25	300	60 375 00
Veterinary kits	2 900 00	12	241 67	500	120 835 00
2-gallon thermos	1 272 00	6	212 00	500	106 000 00
Haversacks	1 101 00	12	91 75	500	45 875 00
Noseleads	520 00	6	86 67	463	40 128 21
Syringes	850 00	6	141 67	463	65 593 29
Needles	20 00	1	20 00	185	3 700 00
Lasso	1 800 00	6	225 00	450	101 250 00
10-liter plastic pails	495 00	3	165 00	100	16 500 00
Vaccination certificates 100	100 00	—	—	2 110	211 000 00
				Sub-Total	1 324 670 82
Capital goods					
Refrigerator	45 500 00	30	1 516 67	153	232 050 51
Motorcycle	35 100 00	12	2 925 00	300	877 500 00
Truck: dble cabin	481 000 00	15	32 066 67	47	1 507 133 49
Truck: sgle cabin, 4-wheel drive	455 000 00	15	30 333 34	57	1 729 000 38
Typewriter: manual	78 000 00	15	5 200 00	16	83 200 00
Calculating machine: manual	15 600 00	15	1 040 00	16	16 640 00
				Sub-Total	4 445 524 38
				Total Soles	5 770 195 20

Translated into US dollars, the third phase of FMD vaccination in Peru totalled US\$178,092.90 calculated at the average official exchange rate (190,70 soles/US dollar) for the period from October 20 to December 20, 1978.

The unit cost of FMD vaccination was US\$0.17 per bovine, which reflects the cost of vaccination throughout Peru. It is understood that the unit

cost varies from Region to Region or from area to area, depending mainly on the number of vaccinations administered in each area.

DISCUSSION

The only known study of FMD vaccination costs is the article published by Astudillo *et al.*

TABLE 5. Cost of foot-and-mouth disease vaccination in Peru. October - December, 1978

Accounts / Items	Soles
01.00 Wages & Salaries	
Wages & Salaries of PNCFA and Animal Health Personnel	10,008,820
02.00 Goods	
Expenses of Goods at central and regional levels	690,199
03.00 Services	
Expenses of services at the central and regional levels	1,318,331
04.00 Social Security Assessments	
Paid to Peruvian Social Security for PNCFA and Animal Health personnel	799,156
- Vaccine	
Cost of 1,025,041 doses of foot-and-mouth disease vaccine at S/.15.00 each	15,375,615
- Depreciation of material	
Depreciation costs of goods per one phase of vaccination (third phase).	5,770,195
Total	33,962,316

Unit cost of vaccination: $\frac{33,962,316}{1,025,041 \text{ bov.}} = 33,13 \text{ soles}$

Average exchange rate: 190,70 soles = US\$1.00 US\$0.17

(1), which served as the basis for this study. The reference study assessed the first stage of vaccination in 1975, initiated in January. The calculated cost of US\$0.21 per bovine was US\$0.04 higher than the per-bovine cost determined herein for Peru, without taking into account the price increases over the January 1975 - November 1978 timespan. One restriction of this study is that it does not account for the private sector's costs in the vaccination operation conducted by the public sector, or the cost incurred by that sector for the 12% of the FMD vaccinations under its entire responsibility. The costs of handling the animals during the vaccination -ranch hands, corrals, equipment, etc.- are likewise not taken into account.

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