

## **BIBLIOGRAPHY**

GLADYS C. BANTOG, November 2006. Awareness of Foot and Mouth Disease (FMD) and the Extent of Implementation and Problems Encountered in its Control Program in Baguio City. Benguet State University, La Trinidad, Benguet.

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## **ABSTRACT**

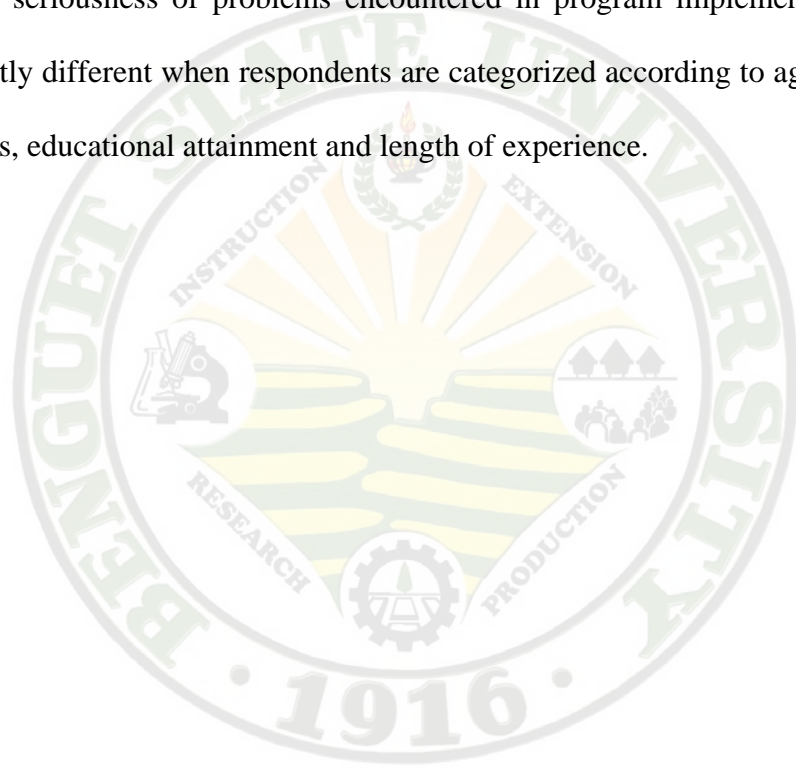
A total of 77 respondents (55 swine raisers and 22 program implementers) were used in the study. Findings show that program implementers are more knowledgeable of the causative agent, animals affected, incubation period, clinical signs, transmission, prevention and treatment of Foot and Mouth Disease (FMD) than the backyard swine raisers.

The hog raisers perceived that FMD control strategies such as public awareness, monitoring and surveillance, animal movement management and vaccination are only partially implemented as against the implementers' perception that the control strategies are fully implemented.

The backyard swine raisers perceived that problems on lack of funds, lack of farmers' cooperation, failure of the farmers to report suspected FMD incidence, lack of sufficient information and lack of support from the local officials are often

encountered (serious) in FMD control program implementation as against the perception of the implementers that the problems are always encountered (very serious).

The perceptions of the hog raisers and control program implementers on the level of FMD awareness, extent of implementation of control strategies and degree of seriousness of problems encountered in program implementation are significantly different when respondents are categorized according to age, gender, civil status, educational attainment and length of experience.



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## **INTRODUCTION**

### Background of the Study

Livestock is of crucial importance to both household and national economies of many developing countries. Livestock and their products (mainly meat, milk and eggs) play a key role as a protein source and contribute to food security at the household level. In addition, livestock make a major contribution to rural income generation and often supply important inputs for agriculture in terms of fertilizer input (manure). Livestock keeping is an agricultural activity in which the marginalized rural poor can participate in and help improve their income. Livestock play a more important role in their well being than can be measured in economic variables.

Livestock production and development in the region has been hampered due to FMD epidemics in the past few years. Based on the report of the National FMD Task Force in December 2001, the Cordillera Administrative region ranked third among the different regions affected with FMD, with the province of Benguet having the highest number of reported cases

Economic losses due to animal diseases in developing countries are serious because of the high degree of dependence of many villagers on livestock for their subsistence. Disease outbreaks such as Foot and Mouth Disease (FMD) epidemics can compromise the benefits gained from livestock production through reduced animal productivity. The control or elimination of FMD is therefore



necessary not only to avoid constant attrition from endemic diseases but also to pre-empt the periodic devastating losses brought by FMD epidemics and the constraints to livestock trade in livestock and their products.

According to the Advanced Veterinary Information System, (AVIS,2002) before attempting to control or eradicate a particular animal disease it is important to define precisely the objective of any proposed measures. Eradication implies a policy in which that the presence of possible incursion of the virus is tolerated. Control implies that the presence of the virus might be tolerated but the effects of the disease are minimized by vaccinated and other zoosanitary measures. The choice of policy adapted by a country depends on its disease status and the risk of incursion of the disease and the methods employed depend upon the prevalence of the disease in particular regions or states, geographical considerations, and the desire to eradicate or simply control.

Livestock raisers/handlers should have basic knowledge on FMD detection and where to report if a case is suspected. Field staff should have sufficient knowledge regarding FMD and its epidemiology. Field staff should be able to recognize appropriate actions in case of an outbreak.

The Bureau of Animal Industry (BAI) reported that the height of FMD epidemic was experienced in 1995, where in the livestock group claimed that they lost revenue in the amount of PHP2 billion due to reduction in sales and





consumer's fear to eat infected pork. A total of 22 provinces in Luzon were hit with the FMD virus at the time with 98,604 animals reportedly affected.

The National FMD Task Force (NFMDTF) was created at the height of the FMD epidemic of 1995 and was spearheaded by the FMD Task Force of the Bureau of Animal Industry Department of Agriculture with major sponsorship from Australian Agency for International Development (AusAID). One of the strategies undertaken to eradicate FMD from the country was through localized approach by strengthening regional FMD control programs of affected areas to enable them to effectively deal with FMD outbreaks and prevent spread of disease to other regions.

This coordinated regional FMD control strategy aimed to facilitate the establishment of FMD-free zones that will facilitate the effective and progressive control and eventual eradication of FMD in the country. This task force is the central point of data collection, processing and coordination of activities (Fig. 1).

One of the two special programs of the Food and Agriculture Organization (FAO) of the United Nations is the Emergency Prevention System (EMPRES). It was created in 1994 to address the enhancement of food security and the fight against transboundary animal diseases and plant pests that cause food shortages, destabilized markets and trigger trade barriers. The NFMDTF of the Bureau of Animal Industry (BAI) has coined a localized EMPRES based on FAO's EMPRES. Included in the Philippine EMPRES are strategies aimed at





protecting FMD-free areas but is also suitable for implementation in endemic, protected and surveillance zones.

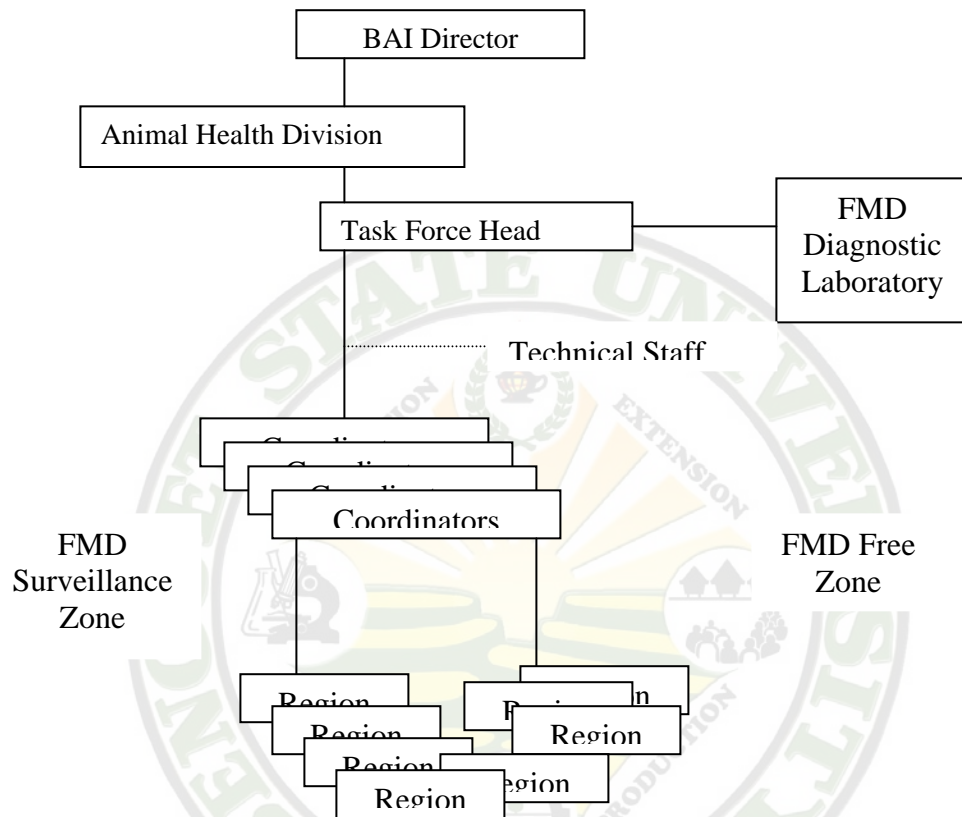


Fig. 1. The set up of the Philippine National FMD Task Force

The strategy has three phases (1996-98; 1999-2002; 2003-2004) of increasing control until freedom from FMD can be declared nationally, and comprises four components: disease monitoring and surveillance, public awareness (information and education), animal movement management and vaccination.



The control of Foot-and-Mouth Disease is primarily in the hands of government policy-makers in most countries and the approach to disease control must be considered within local regulations. The issue of disease reporting was an important one for the disease control campaign. The reported prevalence of the disease was generally a reflection of disease monitoring activity and passive surveillance, and probably underestimates the true prevalence in most countries. There was a strong anecdotal and research evidence of under-reporting of the incidence of livestock diseases, which can present difficulties in economic evaluation of disease control programs.

Notification efficiency in the case of FMD in developing countries is probably quite poor especially so when farmers may not recognize the disease and if they do may not bother to report cases. There is a need to improve and strengthen disease reporting in developing countries in order to come up with reliable data necessary to develop strategic plans for disease control campaigns.

#### Statement of the Problem

Since FMD is a significant disease of livestock, the challenge is to understand the impact of the disease at the small enterprise level and communicate this to national policy makers so that there is appropriate support for animal health issues in national priority setting. More so, when public investments are adequate and properly targeted to deliver vital support services for agriculture to prosper, this creates a lasting, positive impact on the lives of



farmers which in turn will help accelerate the overall growth and development of the economy.

This study dealt with the following questions:

1. What is the socio demographic profile of the respondents in terms of:
  - a. Age
  - b. Sex/Gender
  - c. Civil Status
  - d. Educational Attainment
  - e. Length of service as backyard swine raiser or FMD control program implementer
2. What is the level of awareness on FMD of backyard swine raisers and FMD control program implementers in Baguio City?
3. What is the level of implementation of FMD Control strategies as perceived by FMD control program implementers and backyard swine raisers in Baguio City?
4. What is the degree of seriousness of problems encountered in the implementation of FMD control program as perceived by backyard swine raisers and control program implementers Baguio City?
5. What are the differences in the perceived level of FMD awareness, level of implementation of control strategies and degree of seriousness of problems encountered in program implementation when



respondents are categorized according to specified profile variables (age, gender, civil status, educational attainment and length of experience)?

### Objectives of the study

This study had the following objectives:

1. Determine the socio demographic profile of respondents:
2. Determine the level of awareness of FMD as perceived by backyard swine raisers and FMD Control Program implementers in Baguio City,
3. Determine the level of implementation of FMD Control strategies as perceived by Program implementers and backyard swine raisers in Baguio City,
4. Determine the degree of seriousness of problems encountered in the implementation of FMD Control Program as perceived by backyard swine raisers and Control Program implementers in Baguio City,
5. Determine the differences in the perceived level of FMD awareness, level of implementation of control strategies and degree of seriousness of problems encountered in program implementation when respondents are categorized according to specified profile variables (age, gender, civil status, educational attainment and length of experience).



### Significance of the Study

The result of the study will help evaluate the FMD Control program in Baguio City. It will determine the strength and weaknesses of the strategies in FMD control. It will serve as a reference for program implementers for future strategies in controlling FMD.

It is also important to evaluate the regional FMD control and eradication program to see how far it has contributed in the achievement of this goal. Moreover, since the eradication program was public funded, it should yield a positive economic benefit to justify the intervention.

### Scope and Limitation of the Study

This study assessed the perceptions of backyard swine raisers and FMD control program implementers on the level FMD awareness, level of implementation of control strategies and degree of seriousness of problems encountered in program implementation. This study was administered to specified respondents in the City of Baguio.

### Conceptual Framework

This study was conceptualized with the end view of assessing the perception of backyard swine raisers and control program implementers on the level of FMD awareness, implementation of control strategies and degree of seriousness of problems encountered in program implementation in Baguio City



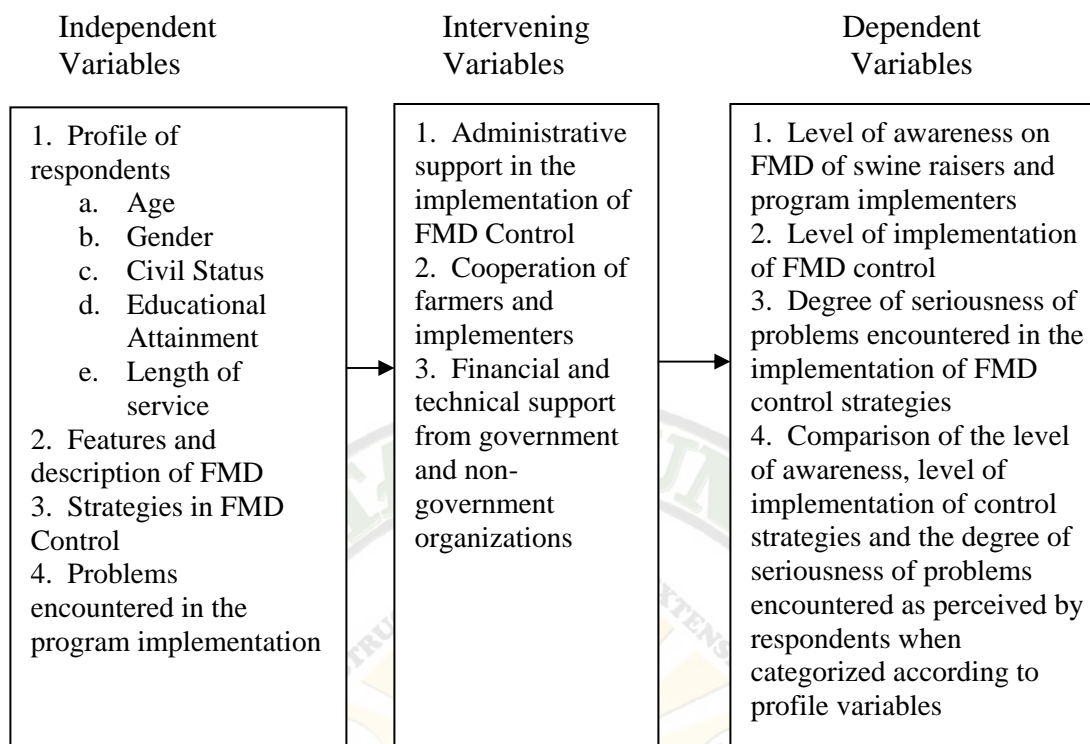


Fig. 2. Paradigm of the Study

The nationwide implementation of FMD Control Program started in 1995 with the general objective of controlling and eventually eradicating FMD in the Philippines. It is therefore expected that the program would serve and meet the expected needs of the community and to attain its objectives, several strategies have been identified. To fully implement the program, there is a need to understand the disease. Cooperation of the community particularly the swine raisers is also enjoined.





### Hypotheses

1. There is a significant difference in the level of FMD awareness of control program implementers compared to backyard swine raisers in Baguio City.
2. There is a significant difference in the level of implementation of FMD Control Program in Baguio City as perceived by backyard swine raisers compared to implementers' perception.
3. There is a significant difference between the perception of backyard swine raisers and FMD control program implementers in the degree of seriousness of problems encountered in the implementation of FMD Control Program Baguio City
4. There are significant differences in the level of FMD awareness, level of implementation of control strategies and degree of seriousness of problems encountered in program implementation when respondents are categorized according to specified profile variables (age, gender, civil status, educational attainment and length of experience).

### Definition of Terms

FMD Control Program Implementers - includes personnel from the Baguio City Veterinary Office, National Meat Inspection Services (NMIS- CAR) and from the



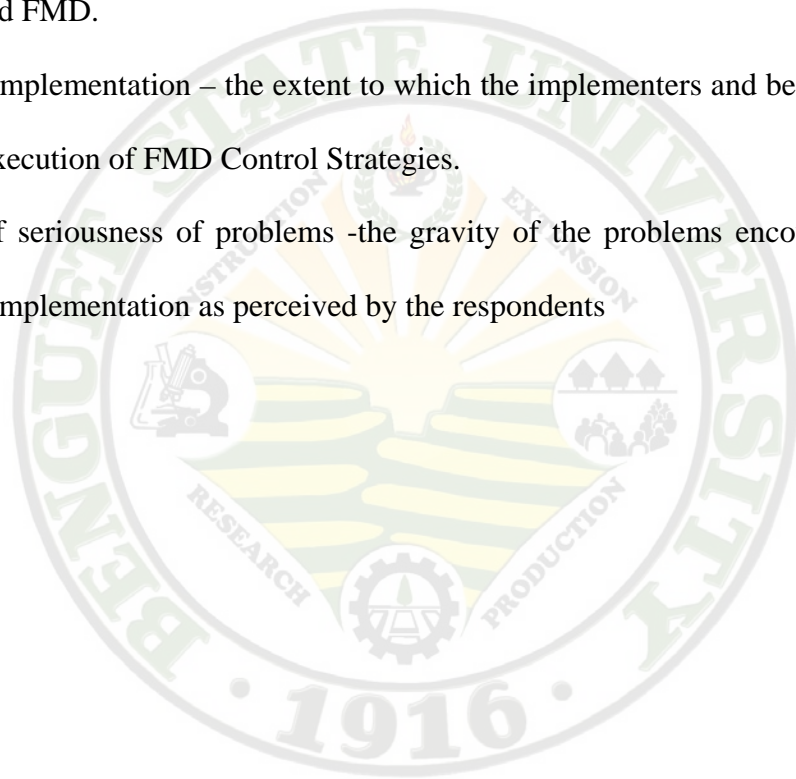
Department of Agriculture (DA-CAR), Livestock sector who play a role in the implementation of FMD Control Strategies in Baguio City

Backyard Swine Raisers - include residents of Baguio City who are raising swine (pigs).

Level of Awareness - the extent to which the implementers and beneficiaries understand FMD.

Level of implementation – the extent to which the implementers and beneficiaries rate the execution of FMD Control Strategies.

Degree of seriousness of problems -the gravity of the problems encountered in program implementation as perceived by the respondents



## REVIEW OF LITERATURE

### Foot and Mouth Disease(FMD)

The name refers to the parts of the body that are visibly affected by the disease, that is, the feet and the mouth. Foot and mouth disease (FMD) is an acute, highly contagious viral disease, mainly (but not exclusively) of cloven-hoofed mammals (cattle, sheep, goats, deer, pigs, camels), which is characterized by the formation of lesions (initially vesicles, later erosions) on the feet and mouth (leading to lameness, salivation and unwillingness to eat), high fever, and sometimes a fatal myocarditis particularly in juveniles (Merchant, 1981).

The causative agent of FMD is an aphthovirus belonging to the family Picornaviridae. It is a small RNA virus which is very infectious, multiplying in and causing damage to cells throughout the body of susceptible animals, and which can survive in the environment for some time. There are seven different serotypes (A, O, C, SAT1, SAT2, SAT3, Asia1), each of which can produce Foot-and-Mouth disease. Of the seven strains, O appears to be the most common and C the least common. Once an animal has had FMD caused by one serotype, it is still susceptible to attacks by the other serotypes and major different strains within the same serotype. Likewise, each serotype or major strain must be vaccinated against separately (Blood, 1983).

Foot-and-Mouth Disease virus replicates very rapidly inside an infected animal and clinical signs usually develop within two weeks (recorded up to three weeks), quite often as little as two days after infection. The time taken for clinical signs to become visible varies within the above range depending on:



(a) virus dose, animals exposed to a higher dose may develop clinical signs earlier, (b) virus strain, some strains are much more invasive and cause more tissue damage earlier, and may affect different species to different degrees, (c) how the virus enters the animal's body, experimental injection of the virus usually causes clinical signs to develop earlier, and (d) animal species or breed infected the time taken for clinical signs to develop in different species may vary, even if the animals are exposed to the same strain of virus under similar conditions.

Transmission of FMD virus is generally by contact between susceptible and infected animals. Ninety five percent of FMD outbreaks were probably the result of direct contact between infected and susceptible animals (AVIS, 2002). The virus can transfer to susceptible animals through the respiratory tract (inhalation of contaminated aerosol droplets), oral route (ingestion of contaminated feeds, milk) and contact with contaminated equipments (fomites) and personnel. All excretions from infected animals contained virus, and may present in milk and semen up to 4 days before clinical signs appear. FMD virus can survive in a dry fecal material for 14 days in summer, in slurry up to 6 months in winter, in urine for 39 days and on soil between 3 (summer) and 28 days (winter)

Explosive FMD epidemics can occur due to several factors like; (a) a diverse host range, which includes all domestic and wild cloven hoofed animals, (b) a low infectious dose regimen, (c) high titer virus excretion, especially aerosols from infected pigs, (d) relative environmental stability as non-enveloped virus, (e) multiple transmission routes, including oral, inhalation and transepithelial, (f) a short incubation period.



The commonly seen clinical signs of active FMD infection is the formation of vesicles or blisters on the skin and mucous membranes (which may appear and rupture within 48 hours post-infection), separation of the hoof from underlying tissue, unwillingness to eat, dullness, salivation, lameness, swelling and pain of the udder, reduced milk yield, fever, weight loss and abortion . Additional clinical signs which maybe seen in young animals and in very susceptible animals include diarrhea, weak irregular pulse, difficulty in breathing, convulsions and sudden death (Merchant, 1981).

Definitive diagnosis of FMD is usually based on the detection of the virus or virus antigens using serological tests. Isolation of the virus is generally carried out on epithelium from intact vesicles (blisters), fluid from vesicles, or the tags of epithelium from the edges of ruptured vesicles. Blood may also be tested for the presence of the virus (Fraser 1991).

Prevention of epidemics is carried out through various preventive and control measures including vaccination, environment control measures through cleaning and disinfection and population control measures through quarantine activities and stamping out (AVIS, 2002).

### Geographical Occurrences of FMD

According to the Office International des Epizooties (OIE), 2002, FMD is a relatively common disease. It is listed in the Category A of Animal Diseases. This list includes all transmissible animal diseases that have the potential for very





serious and rapid spread, irrespective of national borders, that are of serious socio-economic or public health consequences and are of major importance in the international trade of animals and animal products. In 1999, more than 60 countries reported outbreaks. The disease is endemic in the Far East Asia, the Indian Continent, Central Africa and South America. In Europe, there are occasional outbreaks of FMD. A large FMD outbreak that occurred in Britain in 1967 resulted in the sacrifice of more than 400,000 animals. Recent occurrences of FMD include the large outbreak in EU (particularly United Kingdom) in February 2001, which caused the slaughter of more than 2.3 million animals, and the related small outbreak in Ireland, France and Netherlands.

At the international level, FMD is one of the most feared viral diseases of export-oriented livestock industries around the world because of its impact on trade animals and animal products into high value market. The loss of these markets, particularly prime export markets, may have very serious financial implications. As an example, Argentina, Brazil, Chile, Paraguay and Uruguay exported 500,000 tons of chilled and frozen deboned beef in 1989 against receipts of US\$1.3 million. Had this beef been exported with bones to the prime markets (USA and Japan) on the basis of the acknowledged FMD-free status of the region, it was estimated that an additional US\$1.5 billion would have been received (AVIS, 2002).





Historically, the FMD virus was first reported in the Philippines in June 30, 1902 by the City Veterinarian of Manila as a result of the importation of beef cattle from Hongkong to Manila. During the years prior to the Second World War, the disease was recorded virtually every year, but only in ruminants. The first outbreak in pigs was recorded in 1955. The first major outbreak of FMD in the country occurred in Sorsogon and Bukidnon in 1920 and after this, the disease became widespread in the Philippines. Sporadic cases were then observed in Luzon provinces. (Benigno, et.al. 2002)

In August 1994, a team from BAI investigated an alleged FMD outbreak in Tadian, Mt. Province. Serum collected from the animals in the vicinity reacted positively to type A antibody. The area was put under observation but no clinical disease of FMD was observed. In March 1995, FMD outbreaks were widespread in Region II, Region I, and Region III. This time Benguet was also affected. The following month Abra was also hit.

On December 1, 2005, by virtue of Administrative Order No. 36 of Department of Agriculture, Regions I, Cordillera Administrative Region (CAR), except Benguet (including Baguio) and the Province of Aurora were declared FMD free zones with vaccination; and the provinces of Bataan, Tarlac, Pampanga, Zambales, Cavite, Quezon and Rizal as protected zones.

Lantican (2006) reported that year 2006 looks promising for the National FMD Task Force, as no outbreak has been reported for the months of January and



February. In 2005, a total of seven (7) outbreaks were recorded in January while February had the highest number of outbreaks with nineteen (19). FMD cases are usually observed to increase during the first quarter because of the cool temperature and occasional rainfall, which provide a suitable condition for the survival of the FMD virus

### FMD Control

One of the notable projects of the NFMDTF was the school on the (SOA) program which is a mass media based public awareness campaign that has been successful at imparting practical information to farmers with regards to animal production and disease management. From August 1998 to January 1999, a total of 472 participants coming from the different provinces in the region graduated from the SOA program. The program laid the foundation for the establishment of provincial FMD Special Watch and Action team (SWAT) that participated in disease control activities. The Baguio City SWAT was recognized during the 3<sup>rd</sup> Annual Recognition Rites of the AusAID FAO FMD control project because of its active membership and continuous participation in FMD control.

Alcos, et.al. 2002 mentioned that communication management is the organized handling of information, resources and strategies in a given situation that would bring about desired changes in a community. The information, education and communication campaign of the NFMDTF evolved into a more comprehensive approach that communication management. It contributed to the



success of technical campaigns of the program on vaccination, herd-immunity exercises and the task of reaching the grass root farmers to increase their knowledge about FMD

According to Benigno (2001), Public awareness should be extensive before and during a possible FMD outbreak. It was apparent that handling information is vital to the implementation of an animal health program. Information component is always the complementary activity to all the technical components . In previous years public awareness activities occupied the last rung of the disease control strategy, this time, it enjoys priority second however to disease monitoring. This shift came about when it became apparent that an informed public is easier to mobilize in terms of campaigning for preventive measures to be implemented.

Low success rate could be attributed to poor people participation. Poor people participation is not due to low enthusiasm but is attributed to a lack of understanding of what the program is all about. An informed public means higher participation and eventually would lead to the successful implementation of the program, thus experts in the field of communication have resorted to the use of conventional media namely print, television and radio.

Crucial to any disease control activity is availability of precise and prompt data on the status of the disease. This is vital for day to day assessment of the status of the disease. Disease control strategies like where to put up checkpoints



and where to conduct vaccination will depend on information where the disease is. This information is made available only if there is effective disease surveillance system. The objective of the FMD monitoring and surveillance are :

- (a) to study the pattern/behavior of FMD in the field ,
- (b) to identify factors which influence its occurrence and spread,
- (c) to quantify economic losses due to this disease, and
- (d) to get inputs in making feasible disease control strategies

Quarantine is a much older strategy than vaccination or even treatment because it was used long before infectious agents were identified. For diseases that are highly infectious, which means they rapidly spread from one animal to animal such-- as FMD, quarantine is vital and often the only way of controlling the spread of the disease.

The movement of infected animals is considered to be the most common means by which the disease is spread and the control of animal movements is a vital part of controlling FMD. When infected animals, including those which are early in the course of the disease and are not yet showing clinical signs, are moved from one premises to another, they are brought close to uninfected animals. Virus on the breath from these animals easily crosses the short gap to other animals in the same barn, pen or field, particularly when gathered close together, for example around troughs or in milking parlors. Virus in the saliva, urine, feces etc. of infected animals may also enter other animals through, for example, minor breaks in the skin (AVIS. 2002).



Infected animals may also infect susceptible animals while closely confined in vehicles during transport, and in markets. Spread of infection in markets is of great importance in the spread of the disease, because a few diseased animals entering a market may infect large numbers of animals which are then transported back to different properties, where they may in turn infect the livestock on those properties. Virus in the air and on the walls, floor and ceiling of livestock lorries, may also infect animals transported in the lorry after infected animals have been transported

Donaldson as quoted by Benigno et. al (2002) mentioned that the aim of FMD vaccination is to protect animals against production losses. While vaccine is not an assurance against FMD, it could be considered as a weapon against the disease.

Some people have suggest that the simple way to eradicate FMD would be to just vaccinate every pig in the Philippines and it would disappear. Well unfortunately, things are not that simple for the so many reasons. (a) cost - FMD vaccine is expensive from 23.00 to 29.00 a dose plus labor costs. A broad scale vaccination program would be very expensive. Also, the vaccine does not provide lifelong immunity so would have to be repeated every 6 months.

Based on the record of the Department of Agriculture, Cordillera Administrative Region Field Unit (DA-CARFU), a total of 19,993 hogs were vaccinated during the massive vaccination on FMD in 1998 in Baguio City.





In the FMD epidemic of 1995, a total of 98,604 FMD cases were reported with outbreaks totaling to 1,553. Massive vaccination campaigns were conducted throughout Luzon with total of 1,196,035 animals vaccinated.

Perry as quoted by Llanera (2002) mentioned that investing public funds for FMD eradication would mean good investment on the part of the government. Improved livestock production and increased export potential are the main benefits of FMD eradication

Webb (2000), stressed that making use of the numerous, normal and regular visits to Barangays by field staff, to demonstrate and document that “there is no evidence nor suspicion of FMD”, is an essential part of the Control and Eradication program. Negative Barangay monitoring is also an important tool to use in endemically infected areas. This information not only identifies specific areas for immediate action but also provide extra confidence that all outbreaks have been identified in a specific area.

Benigno, et.al (2002) found out in their research in Laguna, that there is a critical proportion that farmers do not report outbreaks on time or do not report at all. There is obvious lack of cooperation among hog raisers which could hinder the government’s control and eradication program against FMD including the assessment of the real situation in the country. Their study also found out that farmers who experienced an FMD outbreak were not able to manage well the infected animals. Most farmers tend to treat the animals while some would dispos





of the dead animals in various ways that usually contribute to further spread of the disease.

### Economic significance of FMD

The national and international consequences of FMD are often considered to be of greatest importance because of the widely publicized impact of FMD on the export of livestock and livestock products from affected countries. Serious outbreaks may disrupt and reduce the local production of animal products to the extent that a country needs to import heavily to meet local needs. The market prices of animals and animal products may rise or fall dramatically following an outbreak, an example being that of the Philippines in 1995 where pork prices halved because of an erroneous rumor that FMD-contaminated meat was able to infect man (Avis 2002)

For meat animals, FMD infection can cause lower rates of live weight gain. Affected animals will often require 10 to 20% longer to reach maturity which would mean that affected 3 year-old beef cattle would need an additional months of feeding and maintenance to reach the maturity. In the case of fattening pigs, growth may be retarded for 1-2 months and British data predict a reduction of 20% per annum in pig meat production under endemic conditions

Losses due to FMD occur in many ways, although loss of production, the expense of eradication and the interference with movement of the livestock and meat between countries are the most important economic effects. Although the



disease is not a killing one (the mortality rate in adults is only 2% and in young stock 20%), animals are severely affected during acute stages of the disease and the period of convalescence is so prolonged that production, both meat and milk is seriously impaired (Blood, 1983)

The impact of FMD can be manifested in different forms that can threaten the local, national, and international agricultural economies of the country. Local consequences of FMD include immediate and longer term effect on animal productivity and usefulness and high mortality rates in young animals. Breeding animals may experience increased abortion rates up to 10% in animal infected during pregnancy and average delays in conception of 8 weeks had been reported. Dairy cattle often suffer an immediate 50 to 60% loss of milk production, due to infection of the glandular epithelium, which is not recovered for the remainder of the lactation period. In addition, the udder may develop secondary infections and mastitis, leading to a permanent partial or total loss of milk production. Consequently, FMD in dairy cattle effected not only short and medium term milk productivity but often leads to the need to cull prematurely (Avis, 2002)

Researchers in the field of animal health management have come up with different modeling techniques used to provide information to help decision-makers optimize animal health management. Various statistical and economic models had been developed and used to come up the appropriate livestock and disease control strategies. Cost-benefit analysis may be used to attempt to



quantify all of the financial consequences of the disease and relate these to full costs of a control or eradication program ( including labor, transport, materials, etc.) Costs of routine control included annual vaccination, emergency vaccination, loss of production, and loss of export earnings in endemic countries. In FMD-free countries, control costs consisted of maintenance of border control, routine surveillance and maintenance of strategic vaccine banks. In the case of an outbreak in FMD-free countries, costs then included costs of slaughter, compensation for slaughter, loss of export earnings, interference with internal trade/production and possibly vaccine use.

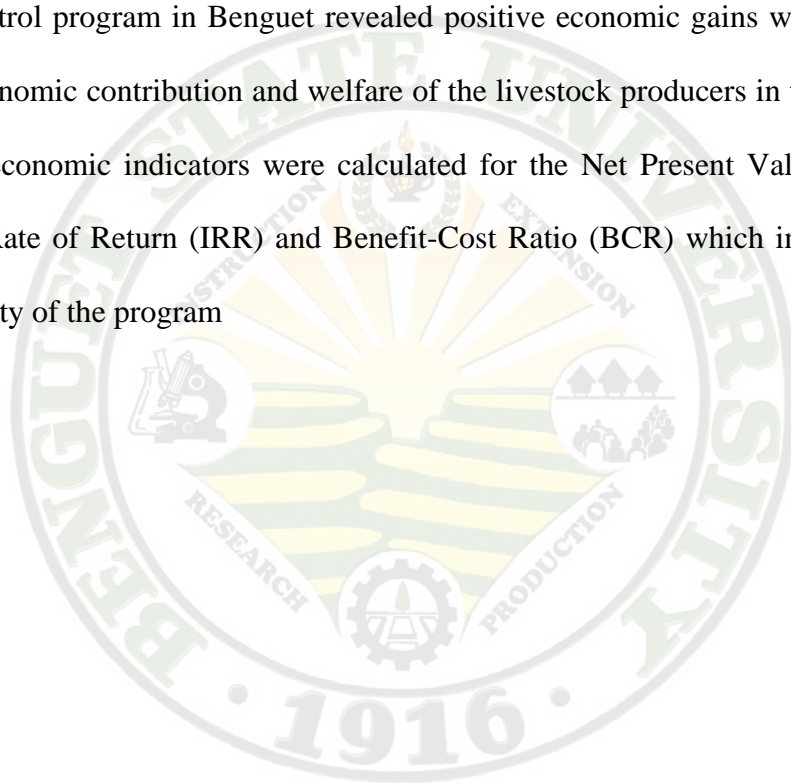
Another study conducted in 1983 by Australia and the Association of South East Asian Nations (ASEAN) to assess the economic impact of FMD in Southeast Asia reported a BCR of 5:1 for the beef industry alone over a 30 year period following FMD eradication in Thailand. Similarly, a BCR of 7:1 was calculated for the pig industry of the Philippines over 30 years following FMD eradication.

In 1997, FAO undertook an economic impact analysis of FMD in the production systems of Laos, Vietnam, and Cambodia. The results of the study illustrated the contrasting impacts of FMD on different production systems. In the village cattle/buffalo system of Laos, an average return to FMD control per head was calculated to range from US\$0.2 to US\$0.5 depending on FMD incidence. In the small dairy system of Vietnam, FMD control was reported to



produce a benefit of US\$ 9 to US\$ 29 per cow with resulting increase of 7% to 24% in gross margin. For the pig industry of Cambodia, FAO reported an improved gross margin of US\$ 7.50 per cow and US\$ 1.50 per finished pig in fattening units, which account to 24 % improvement of the gross margin.

Dumapis (2002), found out that economic cost-benefit analysis of the FMD control program in Benguet revealed positive economic gains with respect to the economic contribution and welfare of the livestock producers in the region. Positive economic indicators were calculated for the Net Present Value (NPR), Internal Rate of Return (IRR) and Benefit-Cost Ratio (BCR) which indicate the profitability of the program



## **METHODOLOGY**

### Locale and time of the Study

The study was conducted in Baguio City from June to August 2006.

### Respondents of the Study

The respondents included 55 backyard swine raisers in Baguio City and 22 program implementers from the Department of Agriculture, Baguio City Veterinary Office, and National Meat Inspection Services.

### Sampling Technique

Primary data was gathered from backyard swine raisers and control program implementers using a questionnaire.

### Instrumentation

A questionnaire was used to gather pertinent information from swine raisers and from program implementers. The questionnaire was pre-tested using a small representative to check the relevance of the question.

### Data Collection

A combination of primary and secondary data was used in the research study. Secondary data was used to provide background information for the research. Secondary data was taken from published and unpublished reports of program implementers such as the City Veterinary Office, Department of



Agriculture – Regional Office, Bureau of Animal Industry-National FMD Task Force, Bureau of Agricultural Statistics.

Primary data was obtained from interviews using questionnaires for swine raisers and program implementers.

### Statistical Analysis

The analysis of variance was employed in the comparison between hog-raisers' and implementers' level of awareness regarding FMD and extent of implementation of the control measures of FMD. The test was computed using the formula given below:

$$F_c = \frac{MS_{BetweenGroup}}{MS_{WithinGroup}}$$

To obtain the computed F-value, the following preliminary computations were done:

1. Sum of Squares

$$\text{Correction Factor} = CF = \frac{Y^2}{n}$$

$$\text{Total Sum of Squares} = \sum \sum Y_{ij}^2 - CF$$

$$\text{Between Group Sum of Squares} = \sum \frac{Y_{i.}^2}{n_i} - CF$$

$$\text{Within Group Sum of Squares} = (\text{Total Sum of Squares}) - (\text{Between Group Sum of Squares})$$

2. Degree of Freedom

$$\text{Total } df = n-1 \text{ (df means degrees of freedom, n is the total number of respondents)}$$





*Group df* =  $p-1$  ( $p$  is the number of groups under the comparison)

*Error df* =  $\sum (n_i - 1)$  ( $n_i$  is the number of respondents in the  $i^{\text{th}}$  group)

### 3. Mean Squares

$$MS_{\text{BetweenGroup}} = \frac{\text{BetweenGroupSum.of.Squares}}{(p-1)}$$

$$MS_{\text{WithinGroup}} = \frac{\text{WithinGroupSum.of.Squares}}{\sum (n_i - 1)}$$

### 4. Computed F-value

$$F_c = \frac{MS_{\text{BetweenGroup}}}{MS_{\text{WithinGroup}}}$$

where

$Y_i$  = total of the  $i^{\text{th}}$  group

$\bar{Y}_i$  = mean of the  $i^{\text{th}}$  group =  $Y_i/n_i$

$Y_{..}$  = grand total

$\bar{Y}_{..}$  = grand mean =  $Y_{..}/n$

Under the null hypothesis, the quantity  $\frac{MS_{\text{BetweenGroup}}}{MS_{\text{WithinGroup}}}$  has an approximate value under the F-distribution. Thus, the null hypothesis will be rejected if  $F_c \geq F_{\alpha, (\text{Trt df}, \text{Error df})}$  otherwise accept  $H_0$ .



## RESULTS AND DISCUSSION

### Respondents' Profile

The hog raisers' and the implementers' profile are presented in Table 1. A big number of hog raisers are from 41 to 60 years old (45.45 %); most are females (56.36%); married (78.18 %); and with high school education (43.64 %). Majority of the hog-raisers have been in the business for almost 11 years or more (40.00 %).

Table 1. Distribution of respondents by profile

RESPONDENT'S PROFILE	HOG-RAISER		IMPLEMENTER	
	Number	Percent	Number	Percent
<i>Age:</i>				
21 – 40 years	20	36.36	17	77.27
41 – 60 years	25	45.45	4	29.00
61 years and above	10	18.18	1	11.00
<i>Gender:</i>				
Male	24	43.64	8	36.36
Female	31	56.36	14	63.64
<i>Civil Status:</i>				
Single	5	9.09	12	54.55
Married	43	78.18	10	45.45
Widowed	7	12.73	-	-
<i>Educational Attainment:</i>				
Elementary	15	27.27	-	-
High School	24	43.64	-	-
College	16	29.09	22	100.00
<i>Number of Years as Swine Raiser/ Implementer:</i>				
5 years and below	18	32.73	9	40.91
6 – 10 years	15	27.27	7	31.82
11 years and above	22	40.00	6	27.27

On the other hand, majority of the implementers are in their 20's to early 40's (48.05 %). Most of them are also females (58.44%), unmarried (54.55 %)



and college graduate (100 %). Their services as implementer of FMD control ranged from 1 year to more than 11 years, the majority are on their fifth year of service.

#### Level of FMD Awareness

Table 2. Perceived level of awareness of the hog raisers and control program implementers.

FOOT AND MOUTH DISEASE	HOG RAISER		IMPLEMENTER	
	Mean	Verbal Rating	Mean	Verbal Rating
Causative agent	2.16 <sup>b</sup>	PA	2.95 <sup>a</sup>	FA
Animals affected	2.42 <sup>b</sup>	PA	3.00 <sup>a</sup>	FA
Incubation period	1.91 <sup>b</sup>	PA	2.91 <sup>a</sup>	FA
Clinical signs	2.18 <sup>b</sup>	PA	2.86 <sup>a</sup>	FA
Transmission	2.23 <sup>b</sup>	PA	2.93 <sup>a</sup>	FA
Prevention	2.16 <sup>b</sup>	PA	2.95 <sup>a</sup>	FA
Treatment	2.13 <sup>b</sup>	PA	2.95 <sup>a</sup>	FA
General Weighted Mean	2.17	PA	2.94	FA
F-value			8.56 <sup>**</sup>	
Probability			0.000	

Means with the same letter do not differ significantly (LSD)

\*\* – highly significant at 1 % level of significance

Legend:	Limit	Extent	Verbal Rating
	2.50-3.0	3	Fully Aware (FA)
	1.50-2.49	2	Partially Aware (PA)
	1.00-1.49	1	Not Aware (NA)

The hog raisers' assessment on the extent of awareness on the FMD was generally low as compared to the implementers' assessment of their knowledge on FMD (Table 2). The numerical rating of 2.16 for causative agent; 2.42 for animals affected; 1.91 for incubation period; 2.18 for clinical signs; 2.23 for



transmission; 2.16 for prevention and 2.13 for treatment were all considered lower as compared to the implementers' knowledge on causative agent (2.95), animals affected (3.00), incubation period of FMD (2.91); clinical signs (2.86); transmission (2.93); prevention (2.95) and treatment of FMD (2.95). Overall, the hog-raisers are partially aware while the implementers are fully aware of FMD in hogs.

The computed F-value of 8.56 was found highly significant at 1 percent level. This indicates that hog raisers' knowledge on FMD is much lower than the implementers' knowledge about FMD. Thus the hypothesis that there is a significant difference in the level of FMD awareness between control program implementers and backyard swine raisers in Baguio City is accepted.

This finding corroborates the result of the research of Benigno, et. al (2002) conducted in Laguna wherein majority of the respondents (93%) do not have sufficient knowledge on FMD.

The findings also show that despite the success of the school on the air (SOA) program of the National FMD Task force in 1999, farmers need to be continuously informed about animal production especially on disease management



### Extent of Implementation of FMD Control Strategies

The extent of implementation of foot and mouth disease control strategies in hogs is shown in Table 3. Making the people aware of the FMD obtained mean rating of 2.02 from the hog raisers and 2.58 from the implementers.

Table 3. Perceived extent of the implementation of FMD control strategies

Control Strategies	HOG RAISER		IMPLEMENTER	
	Mean	Verbal Rating	Mean	Verbal Rating
Public awareness	2.02 <sup>b</sup>	PI	2.58 <sup>a</sup>	FI
Disease monitoring/surveillance	1.77 <sup>b</sup>	PI	2.59 <sup>a</sup>	FI
Animal movement management	2.16 <sup>b</sup>	PI	2.86 <sup>a</sup>	FI
Vaccination	2.25 <sup>b</sup>	PI	2.68 <sup>a</sup>	FI
General Weighted Mean	2.05	PI	2.68	FI
F-value			9.27 <sup>**</sup>	
Probability			0.000	

Means with the same letter do not differ significantly (LSD)

\*\* – highly significant at 1 % level of significance

Legend:	Limit	Extent	Verbal Rating
	2.50-3.0	5	Fully Implemented (FI)
	1.50-2.49	2	Partially Implemented (PE)
	1.00-1.49	1	Not Implemented (NE)

The FMD monitoring and evaluation earned mean rating of 1.77 from hog-raisers, and 2.59 from the implementers. The animal movement management was given mean ratings of 2.16 and 2.86 by the hog-raisers and implementers, respectively. Lastly, vaccination obtained mean rating of 2.25 and 2.68 from the hog-raisers and implementers, respectively. General assessments of



the implementation of FMD control measures differ significantly between hog-raisers and implementers. The hog-raisers are only partially knowledgeable as compared to the implementers who are fully knowledgeable of the implementation of the program on the control of FMD.

An F-value of 9.27 with an associated probability of 0.00 indicates that hog-raisers are less knowledgeable on the control strategies implemented by concerned agencies. Based on the findings, the hypothesis that there is a significant difference in the extent of implementation of control program among backyard swine raisers and control program implementers is accepted.

The findings show that despite the massive vaccination campaign conducted in Baguio City in 1998, and the recognition of the Baguio City FMD Special Watch and Action Team (SWAT) for its active and continuous participation in FMD control in 1999, many farmers are not yet fully aware of the control strategies being undertaken by concerned agencies.

#### Degree of Seriousness of the Problems Encountered in Program Implementation

The degree of seriousness of problems encountered in program implementation as perceived by respondents is presented in Table 4. Lack of funds, lack of farmers' cooperation, failure of the farmers' to report FMD incidence, lack of information and lack of support were rated differently by both respondents. The verbal description of the ratings assigned by the hog-raisers





were only serious but for the implementers, the problems encountered in the implementation of the control measures are all very serious except for the problem on lack of sufficient information which was considered serious only. The backyard swine raisers gave the highest rating to the problem on lack of sufficient information while the control program implementers gave the highest rating to the problem on failure of farmers to report suspected incidence.

Table 4. Perceived degree of seriousness of problems encountered in FMD control program implementation

PROBLEMS	HOG RAISER		IMPLEMENTER	
	Mean	Verbal Rating	Mean	Verbal Rating
Lack of funds	2.05 <sup>a</sup>	S	2.58 <sup>a</sup>	VS
Lack of farmers' cooperation	1.93 <sup>a</sup>	S	2.59 <sup>a</sup>	VS
Failure of farmers to report the incidence	1.91 <sup>b</sup>	S	2.86 <sup>a</sup>	VS
Lack of farmers' sufficient information	2.34 <sup>a</sup>	S	1.82 <sup>a</sup>	S
Lack of support from local officials	1.76 <sup>a</sup>	S	2.68 <sup>a</sup>	VS
General Weighted Mean	2.00	S	2.51	VS
F-value			5.00 <sup>**</sup>	
Probability			0.062	

Means with the same letter do not differ significantly (LSD)

\*\* – highly significant at 1 % level of significance

Legend:	Limit	Extent	Verbal Rating
	2.50-3.0	5	Very Serious (VS)
	1.50-2.49	2	Serious (S)
	1.00-1.49	1	Not Serious (NS)

Based on the findings, there is a need to accept the assumption that there is a significant difference in the degree of seriousness of problems encountered in program implementation as perceived by backyard swine raisers and control



program implementers, except for the problem on lack of sufficient information, which was rated similarly by both groups.

These findings support the findings of Benigno, et. al, 2002, that there is a critical proportion that farmers do not report outbreaks on time or do not report at all. The lack of cooperation among hog raisers could hinder the government's control and eradication program against FMD including the assessment of the real situation in the country.

Perceived Extent of FMD Awareness , Level of  
Implementation of Control Program and  
Degree of Seriousness of Problems  
Encountered According to  
Specified Profile

According to Age

Table 5 presents perceived extent of FMD awareness, level of implementation of control program and degree of seriousness of problems encountered in program implementation according to age of respondents.

The extent of knowledge on FMD of the hog raisers and control program implementers at different age grouping on the causative agent, the animals affected, the incubation period, the clinical signs, transmission, prevention and treatment differ significantly among the three age groups (21 to 40, 41 to 60, and 60 and above). The computed F-values with the associated probabilities below the 1 % level of significance evidently support the above findings that hog raisers are less knowledgeable than implementers.



Table 5. Perceived extent of FMD awareness, level of implementation of control program and degree of seriousness of problems encountered in program implementation according to age

Foot and Mouth Disease	GROUP	AGE			F-value	Prob
		21-40	41-60	61&Up		
<b>A. FMD Awareness</b>						
Causative agent	Hog Raiser	2.10	2.28	2.00	4.71**	.0009
	Implementer	2.84	3.00	3.00		
Animals affected	Hog Raiser	2.25	2.52	2.50	3.10*	.0139
	Implementer	3.00	3.00	3.00		
Incubation period	Hog Raiser	1.85	1.96	1.90	9.34**	.0001
	Implementer	2.88	3.00	3.00		
Clinical signs	Hog Raiser	2.12	2.27	2.10	9.48**	.0001
	Implementer	2.86	3.00	3.00		
Transmission	Hog Raiser	2.05	2.38	2.20	3.92**	.0034
	Implementer	2.91	3.00	3.00		
Prevention	Hog Raiser	2.15	2.24	2.00	4.04**	.0028
	Implementer	2.94	3.00	3.00		
Treatment	Hog Raiser	2.20	2.08	2.10	5.03**	.0005
	Implementer	2.94	3.00	3.00		
<b>B. Implementation of Control Strategies</b>						
Public awareness	Hog Raiser	1.88	1.99	2.36	6.34**	.0001
	Implementer	2.62	2.55	2.00		
Monitoring/ Surveillance	Hog Raiser	1.68	1.74	2.05	7.12**	.0001
	Implementer	2.65	2.50	2.00		
Animal movement management	Hog Raiser	2.12	2.06	2.50	5.75**	.0002
	Implementer	2.94	2.75	2.00		
Vaccination	Hog Raiser	2.40	2.12	2.30	1.39 <sup>ns</sup>	.2367
	Implementer	2.76	2.50	2.00		
<b>C. Degree of seriousness of problems</b>						
Lack of funds	Swine Raiser	2.15	2.00	2.00	0.47 <sup>ns</sup>	.8008
	Implementer	2.18	1.00	2.14		
Lack of farmers' cooperation	Swine Raiser	2.00	1.96	1.70	1.18 <sup>ns</sup>	.3295
	Implementer	2.18	2.75	2.00		
Failure of farmers to report incidence	Swine Raiser	1.85	2.00	1.80	1.04 <sup>ns</sup>	.4017
	Implementer	2.29	2.50	2.00		
Lack of farmers' sufficient information	Swine Raiser	2.10	2.24	2.50	0.55 <sup>ns</sup>	.7352
	Implementer	2.12	2.25	2.00		
Lack of support from local officials	Swine Raiser	1.80	1.84	1.50	0.54 <sup>ns</sup>	.7489
	Implementer	1.82	2.00	1.00		

\*\* – highly significant at 1 % level of significance; \* - significant at 5% level of significance; ns - not significant



Thus, the assumption that there is a significant difference in the perceived level of FMD when respondents are grouped according to age is accepted.

The 21-40 and the 41-60 years old hog raisers' perception on the implementation of information campaign about FMD, monitoring and evaluation of the disease, management of animal movement were found to be significantly lower than the 21-40 and the 41-60 years old implementers perception. However, the extent of implementation of information campaign about FMD, monitoring and evaluation of the disease, management of animal movement as perceived by the 61 or more years old hog raisers are higher than the perceived extent by the 61 or more years old program implementers. The computed F- values for the different control strategies except vaccination support the rejection of the assumption of equal extent of implementation of the information campaign about FMD, monitoring and surveillance of the disease, and animal movement management.

The computed F-values with the associated probabilities are higher than the 5 % level of significance reveal that the hog-raisers' and the implementers' perception on the degree of seriousness of the different problems encountered in the implementation of the FMD program are similar in all age group. Lack of funds, lack of farmers' cooperation, failure of the farmers' to report FMD incidence, lack of information and lack of support were rated similarly by both the hog raisers and the implementers grouped according to age. This findings support



the rejection of the hypothesis that there is a significant difference in the perception of backyard swine raisers and control program implementers in the degree of seriousness of problems encountered in program implementation.

#### According to Gender

The extent of FMD awareness, level of implementation of control program and degree of seriousness of problems encountered in program implementation according to gender is presented in Table 6.

The computed F-values for the causative agent of FMD, affected animals, incubation period, clinical signs, transmission, prevention and treatment of FMD were all significant at 1% level of significance.

The male and the female hog raisers' perception on the implementation of information campaign about FMD, monitoring and evaluation of the disease, management of animal movement were found to be significantly lower than the male and the female implementers' perception. However, the extent of implementation of vaccination as perceived by the male and female hog raisers are at par with the perceived extent by the male and female implementers.

The computed F-values for the different control strategies indicate that there are differences in the perceived extent of implementation of the different control strategies between hog raisers and implementers, thus, the assumptions of equal extent of implementation of the information campaign about FMD,





Table 6. Perceived extent of FMD awareness, level of implementation of control program and degree of seriousness of problems encountered in program implementation according to gender

Foot and Mouth Disease		GENDER		F-value	Prob
		GROUP	Male		
<b>A. FMD Awareness</b>					
Causative agent	Hog Raiser	2.12	2.19	7.45**	.0002
	Implementer	3.00	2.93		
Animals affected	Hog Raiser	2.38	2.45	4.48**	.0061
	Implementer	3.00	3.00		
Incubation period	Hog Raiser	1.83	1.97	16.28**	.0001
	Implementer	3.00	2.86		
Clinical signs	Hog Raiser	2.12	2.34	14.51**	.0001
	Implementer	2.86	2.86		
Transmission	Hog Raiser	2.25	2.21	5.64**	.0016
	Implementer	3.00	2.89		
Prevention	Hog Raiser	2.21	2.13	6.65**	.0005
	Implementer	3.00	2.93		
Treatment	Hog Raiser	2.17	2.10	8.52**	.0001
	Implementer	3.00	2.93		
<b>B. Implementation of Control Strategies</b>					
Public awareness	Hog Raiser	1.95	2.06	7.59**	.0002
	Implementer	2.70	2.51		
Monitoring/surveillance	Hog Raiser	1.79	1.76	10.31**	.0001
	Implementer	2.50	2.64		
Animal movement management	Hog Raiser	2.06	2.24	7.42**	.0002
	Implementer	2.88	2.86		
Vaccination	Hog Raiser	2.29	2.22	1.54 <sup>ns</sup>	.2107
	Implementer	2.75	2.64		
<b>C. Degree of seriousness of problems</b>					
Lack of funds	Swine Raiser	2.25	1.90	1.12 <sup>ns</sup>	.3458
	Implementer	2.38	2.00		
Lack of farmers' cooperation	Swine Raiser	2.29	1.64	5.22**	.0026
	Implementer	2.00	2.43		
Failure of farmers to report incidence	Swine Raiser	2.17	1.71	3.43*	.0214
	Implementer	2.12	2.43		
Lack of farmers' sufficient information	Swine Raiser	2.38	2.13	0.88 <sup>ns</sup>	.4559
	Implementer	2.00	2.21		
Lack of support from local officials	Swine Raiser	2.12	1.48	4.15**	.0090
	Implementer	1.50	2.00		

\*\* – highly significant at 1 % level of significance; \* - significant at 5% level of significance; ns - not significant





monitoring and evaluation of the disease, management of animal movement and vaccination by gender are to be rejected at 5 % level of significance. The above findings suggest that the perceived level of implementation FMD control strategies by the male and female hog raisers are significantly lower than the perceived extent by the male and female implementers.

The computed F-values with the associated probabilities higher than the 5 % level of significance reveal that the hog-raisers' and the implementers' perception on the degree of seriousness on the problems on lack of funds and lack of sufficient information are similar between male and female respondents. Significant differences were noted in their perception on degree of seriousness on the problems on lack of farmer's cooperation, failure of farmers to report incidence and lack of support from local officials.

#### According to Civil Status

Presented in Table 7 are the data on the perceived extent of FMD awareness, level of implementation of control program and degree of seriousness of problems encountered in program implementation according to civil status

Regardless of the marital status either single, married or widowed, the level of FMD awareness differ significantly among backyard hog raisers and control program implementers. Findings show that the unmarried respondents gave higher assessment than the married respondents. The result of the statistical analysis shows that there is a need to reject the assumption of equal level of



Table 7. Perceived extent of FMD awareness, level of implementation of control program and degree of seriousness of problems encountered in program implementation according to civil status

Foot and Mouth Disease	GROUP	CIVIL STATUS			F-value	Prob
		Single	Married	Widow(er)		
<b>A. FMD Awareness</b>						
Causative agent	Hog Raiser	2.00	2.19	2.14	5.59**	.0006
	Implementer	2.92	3.00			
Animals affected	Hog Raiser	2.40	2.44	2.29	3.37*	.0139
	Implementer	3.00	3.00			
Incubation period	Hog Raiser	1.80	1.88	2.14	12.19**	.0001
	Implementer	2.92	2.90			
Clinical signs	Hog Raiser	2.26	2.20	2.19	10.87**	.0001
	Implementer	2.83	2.90			
Transmission	Hog Raiser	1.90	2.30	2.00	4.95**	.0014
	Implementer	2.88	3.00			
Prevention	Hog Raiser	2.40	2.16	2.00	5.17**	.0010
	Implementer	2.92	3.00			
Treatment	Hog Raiser	2.40	2.12	2.00	6.65**	.0001
	Implementer	2.92	3.00			
<b>B. Implementation of Control Strategies</b>						
Public awareness	Hog Raiser	2.00	2.00	2.14	5.58**	.0006
	Implementer	2.67	2.48			
Monitoring/surveillance	Hog Raiser	1.80	1.78	1.71	7.57**	.0001
	Implementer	2.62	2.55			
Animal movement management	Hog Raiser	1.80	2.19	2.28	5.87**	.0004
	Implementer	2.92	2.80			
Vaccination	Hog Raiser	2.80	2.14	2.25	2.56*	.0457
	Implementer	2.83	2.50			
<b>C. Degree of seriousness of problems</b>						
Lack of funds	Swine Raiser	1.80	2.02	2.43	0.93 <sup>ns</sup>	.4522
	Implementer	1.92	2.40			
Lack of farmers' cooperation	Swine Raiser	2.20	1.93	1.71	1.06 <sup>ns</sup>	.3836
	Implementer	2.33	2.20			
Failure of farmers to report incidence	Swine Raiser	2.60	1.91	1.43	2.95*	.0256
	Implementer	2.25	2.40			
Lack of farmers' sufficient information	Swine Raiser	2.60	2.23	2.00	0.66 <sup>ns</sup>	.6188
	Implementer	2.17	2.10			
Lack of support from local officials	Swine Raiser	2.00	1.77	1.57	0.33 <sup>ns</sup>	.8594
	Implementer	1.92	1.70			

\*\* - highly significant at 1 % level of significance; \* - significant at 5% level of significance; ns - not significant



awareness between hog raisers and implementers when grouped according to civil status. The respondents' assessment on the control measures implemented by program implementers was significantly related to the respondent's civil status. Findings reveal that married respondents gave lower assessment than unmarried respondents.

The computed F-values with the associated probabilities higher than the 5 % level of significance reveal that the hog-raisers' and the implementers' perception on the degree of seriousness of the different problems encountered in the implementation of the FMD program are similar in all age group. The perceived degree of seriousness of the problems on lack of funds, lack of farmers' cooperation, failure of the farmers' to report FMD incidence, lack of information and lack of support were found similar between hog raisers and the implementers when grouped according to civil status

#### According to Educational Attainment

College graduate implementers were undoubtedly more knowledgeable of the causative agent, infected animals, incubation period, clinical signs, transmission, prevention, and treatment of FMD than the elementary or high school or college graduate hog raisers (Table 8). The respondents' evaluations were positively related to their educational attainment. This means that the respondents with high level of education are more aware of the causative agent, incubation period, clinical signs and treatment of FMD.



The results shown in Table 8 suggest that the perceived level of implementation of information campaign, monitoring, management of animal movement and vaccination by the hog raisers according to their level of education are significantly lower than the perceived extent of their counterpart.

The computed F-values for the different control strategies indicate that there are differences in the perceived extent of implementation of the different control strategies between hog raisers and implementers according to their level of education, thus, the assumptions of equal extent of implementation of the information campaign about FMD, monitoring and evaluation of the disease, management of animal movement and vaccination by educational attainment of the respondents are to be rejected at 5 % level of significance.

The respondents' assessment on the control measures implemented by program implementers was significantly related to the respondents' educational attainment. The respondents' perception on the implementation of control strategies on monitoring and surveillance, and animal movement management were positively and significantly related to their educational attainment. That is, less educated respondents were less knowledgeable about the two control strategies than the respondents with high level of education. However, except for vaccination, the respondents' perceptions on the extent of implementation of control strategies differ significantly at 1% level of significance.



Table 8. Perceived extent of FMD awareness, level of implementation of control program and degree of seriousness of problems encountered in program implementation according to educational attainment

Foot and Mouth Disease	GROUP	EDUCATION			F-value	Prob
		Elementary	HS	College		
<b>A. FMD Awareness</b>						
Causative agent	Hog Raiser	2.08	2.13	2.31	7.88**	.0001
	Implementer			2.95		
Animals affected	Hog Raiser	2.31	2.42	2.53	4.78**	.0139
	Implementer			3.00		
Incubation period	Hog Raiser	1.83	1.88	2.07	9.34**	.0001
	Implementer			2.91		
Clinical signs	Hog Raiser	2.11	2.15	2.35	15.72**	.0001
	Implementer			2.86		
Transmission	Hog Raiser	2.12	2.23	2.33	5.87**	.0012
	Implementer			2.93		
Prevention	Hog Raiser	2.04	2.12	2.40	7.62**	.0002
	Implementer			2.95		
Treatment	Hog Raiser	2.12	2.13	2.27	5.03**	.0005
	Implementer			2.95		
<b>B. Implementation of Control Strategies</b>						
Public awareness	Hog Raiser	2.24	1.98	1.86	6.34**	.0001
	Implementer			2.58		
Monitoring/ surveillance	Hog Raiser	1.87	1.71	1.78	7.12**	.0001
	Implementer			2.59		
Animal movement management	Hog Raiser	2.20	2.19	2.09	5.75**	.0002
	Implementer			2.86		
Vaccination	Hog Raiser	2.53	2.21	2.06	2.51 <sup>ns</sup>	.0657
	Implementer			2.68		
<b>C. Degree of seriousness of problems</b>						
Lack of funds	Swine Raiser	2.20	2.04	1.94	0.29 <sup>ns</sup>	.8352
	Implementer			2.14		
Lack of farmers' cooperation	Swine Raiser	1.87	1.96	1.94	1.03 <sup>ns</sup>	.3825
	Implementer			2.27		
Failure of farmers to report incidence	Swine Raiser	2.00	1.92	1.81	1.57 <sup>ns</sup>	.2042
	Implementer			2.32		
Lack of farmers' sufficient information	Swine Raiser	2.47	2.25	2.00	1.37 <sup>ns</sup>	.2580
	Implementer			2.14		
Lack of support from local officials	Swine Raiser	1.93	1.88	1.44	1.35 <sup>ns</sup>	.2658
	Implementer			1.82		

\*\* - highly significant at 1 % level of significance; \* - significant at 5% level of significance; ns - not significant





The computed F-values with the associated probabilities higher than the 5 % level of significance indicate that the backyard hog-raisers' and the implementers' perception on the degree of seriousness of the different problems encountered in the implementation of the FMD program are similar among the respondents grouped according to educational attainment (Table 8). The seriousness of the problems on limited funds, limited farmers' cooperation, failure of the farmers' to report suspected FMD incidence, limited information and limited support of the local officials were found similar between the hog raisers and the implementers when grouped according to their educational attainment.

#### According to Length of Experience

Regardless of the work experience of the hog raisers and control program implementers either less than 5 years or 6-10 years or more than 11 years, the respondents level of awareness differ significantly. The result of the statistical analysis shows that there is a need to reject the assumption of equal level of awareness between backyard hog raisers and control program implementers when grouped according to length of experience.

As shown in Table 9, the perceived level of implementation of information campaign, monitoring, management of animal movement and vaccination by the hog raisers according to their length of experience of hog raising are significantly lower than the perception of implementers. The computed F-values for the different control strategies with the associated probabilities lower than the 5 %





Table 9. Perceived extent of FMD awareness, level of implementation of control program and degree of seriousness of problems encountered in program implementation according to length of experience

Foot and Mouth Disease	GROUP	EXPERIENCE			F-value	Prob
		≤ 5 yrs	6-10 yrs	≥11 yrs		
<b>A. FMD Awareness</b>						
Causative agent	Hog Raiser	2.12	2.12	2.50	6.02**	.0003
	Implementer	2.94	3.00			
Animals affected	Hog Raiser	2.36	2.44	2.67	3.61**	.0098
	Implementer	3.00	3.00			
Incubation period	Hog Raiser	1.88	1.88	2.17	12.25**	.0001
	Implementer	2.88	3.00			
Clinical signs	Hog Raiser	2.10	2.32	2.30	11.76**	.0001
	Implementer	2.86	2.88			
Transmission	Hog Raiser	2.06	2.44	2.58	5.82**	.0004
	Implementer	2.91	3.00			
Prevention	Hog Raiser	2.10	2.31	2.17	5.20**	.0010
	Implementer	2.94	3.00			
Treatment	Hog Raiser	2.00	2.31	2.33	7.34**	.0001
	Implementer	2.94	3.00			
<b>B. Implementation of Control Strategies</b>						
Public awareness	Hog Raiser	1.99	2.05	2.05	5.35**	.0008
	Implementer	2.62	2.47			
Monitoring/ surveillance	Hog Raiser	1.67	1.97	1.83	8.85**	.0001
	Implementer	2.66	2.42			
Animal movement management	Hog Raiser	2.11	2.34	2.00	6.10**	.0003
	Implementer	2.94	2.67			
Vaccination	Hog Raiser	2.42	2.19	1.50	3.21*	.0175
	Implementer	2.75	2.50			
<b>C. Degree of seriousness of problems</b>						
Lack of funds	Swine Raiser	2.12	1.88	2.17	0.53 <sup>ns</sup>	.7110
	Implementer	2.25	1.83			
Lack of farmers' cooperation	Swine Raiser	2.12	1.56	1.83	2.44 <sup>ns</sup>	.0545
	Implementer	2.19	2.50			
Failure of farmers to report incidence	Swine Raiser	1.97	1.75	2.00	1.23 <sup>ns</sup>	.2818
	Implementer	2.31	2.33			
Lack of farmers' sufficient information	Swine Raiser	2.21	2.25	2.33	0.13 <sup>ns</sup>	.9721
	Implementer	2.12	2.17			
Lack of support from local officials	Swine Raiser	1.82	1.56	2.00	0.52 <sup>ns</sup>	.7241
	Implementer	1.87	1.67			

\*\* - highly significant at 1 % level of significance \* - significant at 5% level of significance; ns - not significant



level of significance indicate that there are differences in the perceived extent of implementation of the different control strategies between hog raisers and implementers according to their length of experience, thus, the assumptions of equal extent of implementation of the information campaign about FMD, monitoring and evaluation of the disease, management of animal movement and vaccination by length of experience in hog raising of the respondents are to be rejected at 5 % level of significance.

The problems on lack of funds, lack of farmers' cooperation, failure of the farmers' to report suspected FMD incidence, lack of sufficient information and lack of support from local officials were found similarly rated by both the hog raisers and the implementers when grouped according to experience in hog raising or program implementation. The perceived extent of problems encountered in FMD program implementation according to the length of experience of the backyard hog raiser and implementer respondents are statistically with no difference as supported by the computed F-values with the associated probabilities higher than the 5 % level of significance. These findings reveal that the hog-raisers' and the implementers' perception on the degree of seriousness of the different problems encountered in the implementation of the FMD program are similar among respondents with different experiences in hog raising or program implementation.



## **SUMMARY, CONCLUSIONS and RECOMMENDATIONS**

### Summary

This study was conducted in Baguio City to determine: (a) the socio demographic profile of the respondents; (b) the level of FMD awareness of backyard swine raisers and control program implementers; (c) the level of implementation of FMD control strategies as perceived by backyard swine raisers and control program implementers; (d) the degree of seriousness of problems encountered in FMD control program implementation as perceived by backyard swine raisers and control program implementers; and (e) the differences in the respondents perceptions when they are categorized according to specific profile variables (age, gender, civil status, educational attainment and length of experience).

Seventy seven (77) respondents (22 control program implementers and 55 backyard swine raisers) were used in the study.

### Findings

The salient findings of the study are the following:

1. The hog-raisers mostly women are quite older than the implementers. Majority of the hog-raisers are married while the implementers are mostly single. The most number of the hog-raisers have high school education while the implementers are all degree holders. Most of the hog-raisers



have been in the business for more than 11 years now whereas, the implementers have more or less 5 years of service

2. Backyard swine raisers are only partially knowledgeable about FMD while control program implementers are fully aware.
3. The hog-raisers perceived that the control strategies such as public awareness, FMD monitoring/evaluation, animal movement management and vaccination are only partially implemented as against the implementers' perception that the control strategies are fully implemented
4. The problems encountered in control program implementation like lack of funds, lack of farmers' cooperation, failure of the farmers to report FMD incidence, lack of sufficient information and lack of support from the local officials were perceived by backyard swine raisers and control program implementers as serious and very serious respectively.
5. The perceptions of the respondents on the level of FMD awareness are significantly different when respondents are categorized according to age, gender, civil status, education attainment and length of experience. The respondents perception on the extent of implementation of FMD control programs on public awareness, disease monitoring and surveillance; and animal movement management are significantly different when they are grouped according to age, gender, civil status, education attainment and length of experience . However, their perceptions on the extent of



implementation of vaccination as a control strategy are the same except according to gender. The perceptions on the degree of problems on lack of funds, lack of farmer's cooperation, failure of farmers to report suspected FMD incidence, lack of farmers' sufficient information and lack of support from local officials are the same when they are grouped according to age, educational attainment and length of experience. When grouped according to gender, their perceptions differ significantly on the problem on lack of farmers' cooperation, failure to report suspected FMD incidence and lack of support from local officials, however, for the problem on lack of funds and lack of sufficient information, their perceptions are similar.

### Conclusions.

The following conclusions were made based on the above findings:

1. Hog-raisers are less knowledgeable about FMD than the control program implementers
2. Hog-raisers are less informed about the strategies to control FMD than the control program implementers
3. Hog-raisers perceived that the problems encountered in FMD control program implementation are serious while implementers perceived them as very serious.





4. There are significant differences in the perceptions of both hog raisers and control program implementers on the level of FMD awareness, level of implementation of Control strategies and degree of seriousness of problems encountered when respondents are categorized according to age, gender, civil status, educational attainment and length of experience.

### Recommendations

Based on the findings and conclusions the following recommendations are offered:

1. There is a need to strengthen information dissemination on FMD especially to swine raisers who are directly affected with the disease.
2. There is a need to continue implementation of FMD control strategies even with out the presence of outbreaks.
3. There is a need for a collective effort for implementers and swine raisers to keep them updated of the disease and it control measures.
4. Backyard swine raisers and control program implementers, regardless of their socio demographic profile should be knowledgeable about FMD, its control measures and problems encountered in program implementation.
5. It is also recommended that a further study be conducted to include livestock traders and meat vendors since they have been identified as transmitters of the disease.





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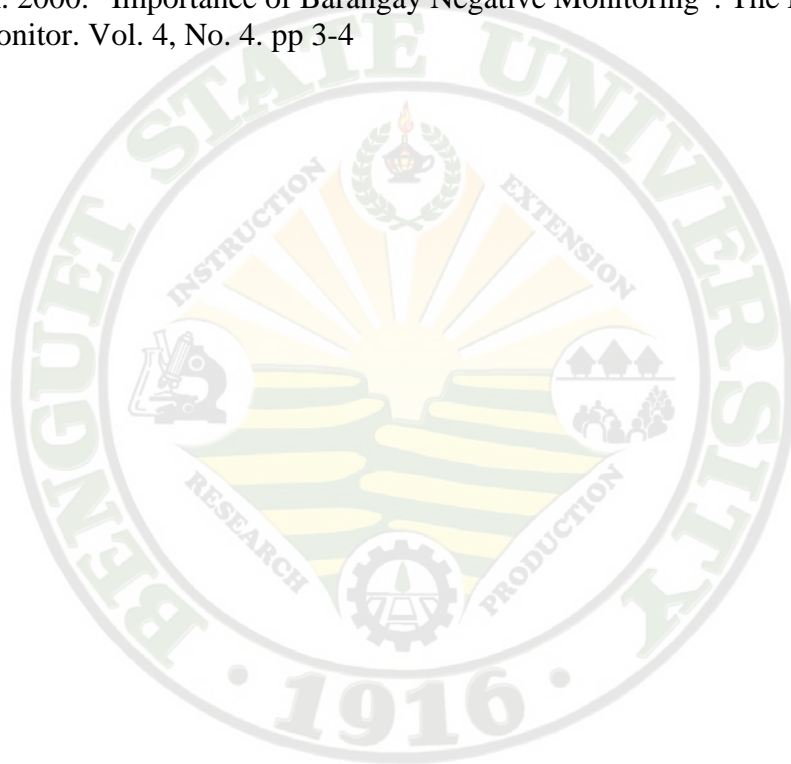
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## APPENDICES

Appendix Table 1. FMD Outbreaks in Luzon from 1998 to 2005

Year	CAR	Region I	Region II	Region III	Region IV	Region V	Region VI	NCR	Total
1998	60	39	1	191	1	11	0	16	319
1999	35	43	1	154	1	17	51	35	337
2000	27	21	9	139	108	9	0	15	328
2001	21	6	6	106	89	23	0	16	267
2002	19	3	0	122	130	8	0	47	329
2003	17	5	0	87	84	2	0	81	276
2004	6	8	1	18	36	0	0	40	72
2005	4	0	0	10	0	0	8	18	40
<b>Total</b>	<b>189</b>	<b>125</b>	<b>17</b>	<b>827</b>	<b>413</b>	<b>70</b>	<b>59</b>	<b>268</b>	<b>1968</b>

Source: National FMD Task Force, DA-BAI

Appendix Table 2. FMD Outbreaks in CAR from 1998 to 2005

Year	Abra	Apayao	Baguio City	Benguet	Ifugao	Kalinga	Mt. Province	Total
1998	0	0	46	13	1	0	0	60
1999	0	0	15	18	2	0	0	35
2000	2	0	18	7	0	0	0	27
2001	0	0	14	7	0	0	0	21
2002	0	0	7	12	0	0	0	19
2003	4	0	4	8	0	0	1	17
2004	0	0	2	4	0	0	0	6
2005	0	0	3	1	0	0	0	4
<b>Total</b>	<b>6</b>	<b>0</b>	<b>109</b>	<b>70</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>189</b>

Source: National FMD Task Force, DA-BAI



Appendix Table 3. Premises Affected in CAR FMD Outbreaks from 1998 to 2005

Province	Premises	1998	1999	2000	2001	2002	2003	2004	2005
Abra	Backyard farm			1			3		
	Slaughterhouse			1			1		
Benguet	Auction market	1	1	1				1	
	Backyard farm	56	30	22	21	19	10	5	1
	Slaughterhouse	2	2	2			2		3
Ifugao	Backyard farm	1	1						
	Slaughterhouse		1						
Mt. Province	Backyard farm						1		
		60	35	27	21	19	17	6	4

Source: National FMD Task Force

Appendix Table 4. Sources of FMD Outbreaks in CAR from 1998 to 2005

Province	Source	1998	1999	2000	2001	2002	2003	2004	2005
Abra	Fomites						1		
	Introduced Animals			1					
	Slaughterhouse						3		
	Swill			1					
Benguet	Auction Market		1	1				1	
	Backyard Farm	11	4	2	1	1	1		
	Fomites						2	2	
	Introduced Animals	3	6	2	1	3	2		
	Slaughterhouse	5	1	2	1		2		3
	Swill	35	17	15	18	13	4	2	1
	Viajero	1	3	1		2	1	1	
	Unknown	4	1	2					
Ifugao	Slaughterhouse	1							
	Unknown		2						
Mt. Province	Unknown						1		
		60	35	27	21	19	17	6	4

Source: National FMD Task Force



## QUESTIONNAIRE

## I. SOCIO DEMOGRAPHIC PROFILE OF RESPONDENT

NAME \_\_\_\_\_

AGE:

- 21 to 40 years  
 41 to 60 years  
 61 and above

SEX:

- Male  
 Female

ADDRESS/AGENCY: \_\_\_\_\_

CIVIL STATUS:

- Single  
 Married  
 Widowed  
 Separated

EDUCATIONAL ATTAINMENT:

- No Schooling  
 Elementary  
 High School  
 College

Number of years as swine raiser/program Implementer (Length of experience)

- 5 years and below  
 6 to 10 years  
 11 years and above



## II. FMD AWARENESS

Direction: Using the scale below please rate your level of awareness on FMD by checking the appropriate column.

- 3 - Fully Aware (Awareness with a percentage of 86-100%)
- 2 - Partially Aware (Awareness of 75 – 85%)
- 1 - Not aware (Awareness of 74% and below)

Foot and Mouth Disease	3	2	1
1. Causative Agent. FMD is caused by a virus			
2. Animals Affected - FMD virus affects all cloven-hoofed animals such as pigs, sheep, goats, carabao and cattle			
3. Incubation period - FMD virus replicates very rapidly inside an infected animal and incubation period ranges from 24 to 48 hours			
4. Clinical signs			
a. Blister formation on feet and mouth			
b. Unwillingness to eat (in appetite)			
c. Lameness			
d. Fever			
e. Detachment of hooves			
f. Weight loss			
g. Reduced milk yield			
h. Abortion			
i. Difficulty in breathing			
j. Sudden death			
4. Transmission			
a. Direct contact with ruptured vesicles, saliva, breath, feces, urine, and milk			
b. Indirect contact with objects which have been contaminated by discharges on infected stock like meat, blood, hides, vehicles, beddings, clothing, footwear, and hay			





5. Prevention			
a. Vaccination			
b. Environment control (cleaning and disinfection) - using disinfectants like chlorox, soda ash, lysol and other agents			
c. Quarantine activities			
6. Treatment. There is no known treatment for FMD. However, antibiotics can be administered to prevent secondary bacterial infection and use of topical agents like vinegar and gentian violet around the blisters or vesicles			

### III. IMPLEMENTATION OF FMD CONTROL STRATEGIES

Direction: Using the scale below please rate the level of implementation of FMD Control Strategies in Baguio City by checking the appropriate column

- 3 - Fully Implemented (Always employed/practiced)
- 2 - Partially Implemented (Employed/practiced once in a while)
- 1 - Not Implemented (Never employed/practiced)

FMD Control Strategies	3	2	1
1. Public Awareness			
a. Networking and linkages with tri-media			
a.1 Newspaper/magazine			
a.2 Radio			
a.3 Television			
b. Community mobilization activities (Farmer/s Forum)			
c. Workshops, trainings and seminars			
2. FMD Monitoring and surveillance			
a. Passive Surveillance - dependent on farmer's report			
b. Active surveillance - programmed activity, initiative comes from the implementer, negative monitoring activities, collection of samples			



3. Animal Movement Management			
a. Effective Quarantine of animals meat products and people			
b. Environmental control – emphasizing on cleaning and disinfection			
4. Vaccination - massive			

#### IV. PROBLEMS ENCOUNTERED IN PROGRAM IMPLEMENTATION

Direction: using the scale below, please rate the degree of seriousness of the problems encountered in the implementation of FMD control strategies in Baguio City by checking the appropriate column.

- 3 - Very Serious (Always encountered)
- 2 - Serious ( Often encountered)
- 1 - Not serious (Never encountered)

Problems	3	2	1
1. Lack of funds			
2. Lack of farmer's cooperation			
3. Failure of farmer's to report incidences			
4. Lack of farmer's sufficient information			
5. Lack of support from local officials			
6. Other (Please specify)			

Thank you very much!!!!!!



## BIBLIOGRAPHICAL SKETCH

Gladys B. Cunning – Bantog, was born on August 14, 1969 in Besao, Mountain Province. She is the fifth of the six children of Augusto M. Cunning, retired Anglican Priest and Agnes Botengan Cunning, a retired elementary school teacher.

Her elementary education was spent at the Agawa Elementary School, Agawa, Besao, Mt. Province where she graduated first honor. She attended High school education in St. James High School, Besao, Mt. Province, graduating as second honorable mention.

She finished Bachelor of Science in Animal Technology (BSAT) at the Benguet State University in March 1990, and graduated Doctor of Veterinary Medicine (DVM) in March 1995 also in the same university. She passed the licensure examination in August 1995.

She started her work experience when she was hired as contractual research assistant in a non-government organization, the Igorot Tribal Assistance Group (ITAG) after graduation from BSAT in May 1990. In Oct 1996, she was employed in the Department of Science and Technology, (DOST-CAR) as science research assistant and in May 1999, she was promoted to data encoder/controller.

In July 2000, she found the agency fitted for her profession. She was employed by the City Government of Baguio under the City Veterinary Office. It



was during this time that she decided to pursue her Masters degree in Public Administration which she started when she was still with DOST-CAR. Finally in October 2006, she defended her manuscript.

Gladys is married to Police Inspector Johnson D. Bantog II with whom they are blessed with three kids, Deemugh Agnes, Maria Lila and Johnson III. Presently, they reside at Purok 5, Upper Brookside, Baguio City.

