



# Final Report

A REVIEW OF FREE RANGE DUCK FARMING SYSTEMS  
IN INDONESIA  
AND ASSESSMENT OF THEIR IMPLICATION  
IN THE SPREADING OF  
THE HIGHLY PATHOGENIC (H5N1) STRAIN OF  
AVIAN INFLUENZA (HPAI)



A report  
from the Center for Indonesian Veterinary Analytical Studies (CIVAS)  
for the Food and Agricultural Organization (FAO) of the United Nations

2006

## **Acknowledgments**

Center for Indonesian Veterinary Analytical Studies (CIVAS) as the author would like to thank to all the people who contributed to this study. Especially to Food and Agriculture Organization of the United Nations (FAO) as a facilitator of the study. Warmly thanked to Ms. Emmanuelle Guerne-Bleich as a person of FAO Rome for all support had been given, also to Dr. M. Stephen Swan for very details and warm conversation of questionnaire consultation.

The very much thank also like to extend to all farmers and district authorities officers participating in the study. Thank you for all good cooperation, support and warm time we had gotten in each district area as locations of the study.

The best wishes is that this report as result of the study would give an advantages as information source for whole part person and stakeholders involved in the objective especially for the implementation of better free-range duck farming system in Indonesia.

## Table of Contents

	Page
Acknowledgment .....	i
Table of Contents .....	ii
List of Tables .....	iv
List of Figures .....	vi
List of Annexes .....	vii
Executive Summary .....	viii
Acronym/Abbreviations .....	x
I. Introduction .....	1
1.1. Description of Duck Husbandry System and Duck Production System in Indonesia .....	1
1.2. History of HPAI in Indonesia .....	9
1.3. Avian Influenza Cases in Duck .....	10
II. Rational of The Study .....	12
III. Objective of The Study .....	12
IV. Methodology .....	12
4.1. Location of The Study .....	12
4.2. Organization of The Study .....	14
4.2.1. Pre Survey .....	14
4.2.2. Farmers Interview .....	14
V. Schedule of The Study .....	15
VI. Result and Discussion .....	15
6.1. Description of Free-Range Duck in The Study Area.....	15
6.1.1 General Picture of District Location Questionnaire Survey .....	15
1. Pemalang .....	15
2. Brebes .....	16
3. Cirebon .....	16
4. Subang .....	17
5. Tangerang .....	17
6.1.2 Result of Farmer's Questionnaire .....	17
1. Respondents/Farmer Characterization .....	19
2. Husbandry Systems .....	22
A. Kind of Species, Number of Animal and Origin of Ducks .....	22
B. Herding System (Free-Range System) .....	24
C. Additional Feed .....	29
D. Confinement System .....	32
E. Labour Input .....	34
3. Production System .....	36
4. Health System .....	38
5. Marketing System .....	48
6. Respondents Experience on Avian Influenza .....	51

6.1.3 Result of District Officer's Questionnaire .....	53
1. General Problems and Trouble Shooting Done in Duck Farming .....	54
2. Experiences of District Officer on Handling of Avian Influenza Case .....	54
6.2. Discussion .....	55
6.2.1. Identification of Key Risk Areas in The Production Systems/Cycles for Possibility of HPAI Transmission .....	55
6.2.2. Percentage of Farmers Choosing Not to Restock or Switching to Other Species .....	57
6.2.3. The Response from The Government .....	57
6.2.4. Review of Potential Options for Production System for The Future to Reduce The Risk of HPAI Transmission .....	58
VII. Conclusion and Recommendation .....	59
7.1. Conclusion .....	59
7.2. Recommendation .....	60
References .....	61

## List of Table

Table		Page
1	Duck population by province (2004) .....	1
2	Three types of duck husbandry system in Indonesia .....	2
3	General classification of ducks .....	5
4	Duck breeds well known use in Indonesia .....	6
5	The performance of ducks for egg production in Indonesia ....	6
6	The performance of ducks for meat production in Indonesia ..	8
7	The result of the sample of the duck cloacal swab in six (6) regencies in the Javanese island .....	10
8	The result of AI serology inspection in the duck in several provinces in Indonesia .....	11
9	The five (5) districts identified as the study location of the survey .....	13
10	The schedule of pre survey .....	14
11	The schedule of the study .....	15
12	Percentages of duck feed resources of total respondents .....	18
13	Percentages of the three groups of farmers based on the duck feed resources in each district area .....	19
14	Respondents characterization in each district area .....	20
15	Respondents characterization based on duck feed resources .....	21
16	Figure of ducks variation reared by respondents in each district area .....	23
17	Figure of ducks variation reared by respondents based on duck feed resources .....	24
18	Herding systems done by respondents in each district area ..	26
19	Herding systems done by respondents based on duck feed resources .....	28
20	Herding locations and various of feed found in the herding area .....	29
21	Additional feed given by farmers in each district area .....	30
22	Additional feed given by farmers based on duck feed resources .....	30
23	Kind of additional feed usually used by respondents in each district area .....	31
24	Kind of additional feed usually used by respondents based on duck feed resources .....	31
25	Confinement systems built by respondents in each district area .....	32
26	Confinement system built by respondents based on duck feed resources .....	33
27	Labors input system run by respondents in each district area.	35
28	Labors input system run by respondents based on duck feed resources .....	35
29	Production system of duck farm run by respondents in each district area .....	37
30	Production system of duck farm run by respondents based on duck feed resources .....	38
31	Animal health program for ducks done by respondents in each district area .....	40

32	Animal health program for ducks done by respondents based on duck feed resources .....	41
33	Symptom of diseases often found and the treatment done by respondents in each district area .....	42
34	Symptom of diseases often found and the treatment done by respondents based on duck feed resources .....	43
35	Symptom of diseases often found by respondents and its relation with common diseases in duck .....	43
36	Illustration of ducks mortality belongs to respondents in each district area .....	45
37	Illustration of ducks mortality belongs to respondents based on duck feed resources .....	46
38	Frequency and the way to clean up confinements by respondents in each district area .....	47
39	Frequency and the way to clean up confinements by respondents based on duck feed resources .....	48
40	Marketing system done by respondents in each district area ..	49
41	Marketing system done by respondents based on duck feed resources .....	50
42	Figuration of Avian Influenza case based on respondents information in each district area .....	51
43	Figuration of Avian Influenza case based on respondents information and also based on duck feed resources .....	52
44	Percentage of respondents who said never been found AI on their area but their fowls died because of AI .....	52
45	Illustration of respondents who have fowls attacked by AI .....	53
46	Key risk areas identified in the production systems/cycles run by respondents for possibility of HPAI transmission .....	55
47	Percentage of farmers choosing not to restock or switching to other species .....	57

## List of Figure

Figure		Page
1	Scheme of duck production system furrow in the relation with marketing system generally done in Indonesia .....	8
2	Location of the study .....	13
3	Marketing system scheme done by all respondents .....	50

## **List of Annexes**

<b>Annex</b>	<b>Page</b>
1 Form A : Questionnaire for District Officer .....	62
2 Form B : Questionnaire for Farmer .....	67
3 Result of Questionnaire for District Officer .....	77
4 Field Activity Pictures .....	82



## Executive Summary

It is well known that ducks is one of the aquatics birds who act as a reservoir for all influenza viruses. In the relation with that information, the free-ranging duck husbandry system have a high possibility to play an important role in spreading influenza viruses because of the movement of ducks. Based on that fact, study about free-range duck farming systems in Indonesia held by Food and Agriculture Organization of the United Nations (FAO) in the cooperation with Center for Indonesian Veterinary Analytical Studies (CIVAS). This study is a part of whole FAO studies that also done in Vietnam. The main objective of the study is to learn more about the free-range duck farming system in Indonesia and understand better their role in the possibility in the spreading of HPAI. The study will also identify additional knowledge gaps that will require investigation and make preliminary recommendations on practical husbandry related control measures.

The study of free-range duck farming system in Indonesia done in 5 (five) district identified as location of the study which are District of Pemalang and District of Brebes (Province of Central Java), District of Cirebon and District of Subang (Province of West Java) and District of Tangerang (Province of Banten). This study based on main sources of information which are primary data as result of questionnaire and direct interviews with farmers and district officers. Secondary data achieved from documents provided by the districts and literature research through searching literatures in libraries and browsing internet. Total respondents involved in this study are 150 duck farmers, consists of 30 farmers in each district area identified as locations of the study.

Result of the study in Indonesia show that 86% of total respondents as the highest percentages of respondents (129 farmers interviewed) applied the herding system and give additional feed (free range with additional feed). Only 15% of total respondents (10 interviewed farmers) applied the free range - scavenging system, and 6% of total respondents (4 interviewed farmers) applied fully feeding system without herding but still provide free-range area for the duck. Related to the classification of husbandry system commonly used in Indonesia, free range - scavenging system is mostly similar with the extensive system whiles both free range with additional feed and fully feeding every day without herding are included into semi-intensive system. As Gilbert et. al (2006) stated that areas where both extensive and semi-intensive poultry production systems coexist were believed to be particularly at risk in context of spreading of HPAI.

Several key risk areas had been identified in the production systems/cycles for possibility of HPAI transmission. The risk area identification done based on result of questionnaire and also supported by several literatures as result of researches done in other countries. Furthermore, the criteria between high and low risk area can not be absolutely obtained because there was not any serological test done included in the study. Other reason is there is no positive

correlation between result of questionnaire with HPAI cases happened in the district identified. Based on questionnaire result only 4 respondents (2,6% of total respondents ) mentioned that their duck infected by Avian Influenza. The main key risk areas in the production systems/cycles explained above are: (1) Movement of duck from one rice-field area to other area, (2) Contact with other fowls or animal, (3) Contact with human, (4) Improper feeding system, (5) Bad sanitation, (6) Improper handling of dead duck, (7) Improper handling of sick duck, (8) Improper handling of by-product, (9) Improper handling of farm output, and (10) Low farmers awareness of the disease.

Conclusion of the study is that free-range duck farming systems in Indonesia has possibility role in spreading the HPAI viruses by identifying several key risk areas in the production systems/cycles of free-range duck system husbandry. This conclusion need to be more analyzed with further serological study and other laboratories diagnostic studies in the context of HPAI in ducks. Optional duck production system for the future is improvement of free-range duck systems in Indonesia and applying a better biosecurity in semi-intensive duck husbandry system. Besides the 9 (nine) strategies of Avian Influenza prevention which is stated in the Decree of Director General of Livestock Services No 17/ KPTS/PD.640/02.04 and established instrument in controlling AI, other legislation and regulation are needed especially on free-range duck husbandry system based on economical and social condition analysis of Indonesian duck farmers.

## Acronym/Abbreviations

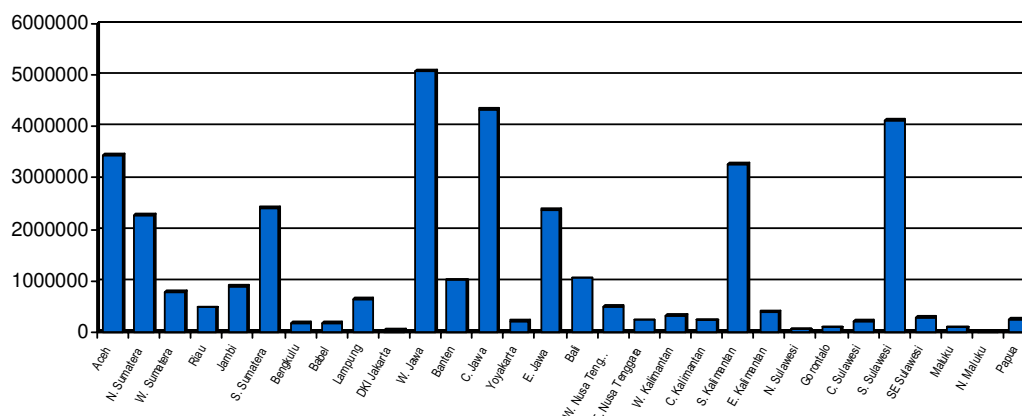
<i>BBPV</i>	<i>Balai Penyidikan Penyakit Hewan</i>
<i>BPPT</i>	<i>Balai Penyidikan Penyakit Ternak</i>
CFR	Case Fatality Rate
DIC	Diseases Investigation Centre
<i>DIY</i>	<i>Daerah Istimewa Yogyakarta</i>
DOD	Day Old Duck
FAO	Food and Agriculture Organization of the United Nations
GPS	Grand Parent Stock
HPAI	Highly Pathogenic of Avian Influenza
kg	kilogram; unit of weight equaling one thousand grams
lbs	pounds; unit of weight equaling 16 oz
m	meter; basic unit of length in the metric system
PS	Parent Stock
<i>UPTD</i>	<i>Unit Pelaksana Teknis Daerah</i>

## I. INTRODUCTION

### 1.1. Description of Duck Husbandry System and Duck Production System in Indonesia

In Indonesia, ducks is one of poultry commodity which less important in comparison with chicken. Ducks only represent 2.77% of the total poultry population. Ducks population in Indonesia had been fluctuated, from 32,068,244 heads in 2001, grew up to 46,000,882 heads in 2002. In 2003, the population decreased to 33,862,823 heads, 32,572,780 heads in 2004, and then slightly increased to 34,275,340 heads in 2005 (Agricultural Statistics Book, 2005).

**Table 1. Duck population by province (2004)**



However, duck still become one of important poultry commodity both in small-medium scale poultry and commercial poultry because of the high advantages in commercial business and high nutrition for human. As well as providing income and feed to farmers, ducks also helps control insects and weeds in irrigated rice-fields. Table 1 show the population by province in Indonesia, where the main duck areas are the province of West Java, Central Java, South Sulawesi, Aceh and South Kalimantan.

Based on husbandry system, there are 3 (three) types of main duck farming system in Indonesia : (1) traditional system/scavenging-herding system (extensive system), (2) semi-intensive system, and (3) intensive system. The differentiation of the three types of duck husbandry system are seen in Table 2 below.

**Table 2. Three types of duck husbandry system in Indonesia**

Types:	Extensive	Semi-intensive	Intensive
Husbandry	Herding system	Moving around within a confinement	Kept in a confinement
Feeding	100% natural feed	50% industrial feed and 50% natural feed	100% industrial feed
Confinement	Simple confinement without pond	Kept in a confinement with a pond	Individual confinements
Prevention and medication for diseases	Without any vaccination or medication	Sometimes	Intensive vaccination and medication

*Source : Widjaya, K (2004)*

Traditional system (extensive system) is mostly done by herding ducks to find locations of feed sources such as rice field or swampy areas. Ducks usually herding by farmer daily looking for feed from paddy outcasts, unhulled rice, small fish and planktons in the rice-field area.

In Indonesia, herded flocks under the care of a single herdsman are usually in the size range from 90 to 130. During the day, a flock of ducks, usually mature females, are allowed to search for feed in harvested rice fields and other areas where feed is plentiful. At night, the flock is returned to a confinement, usually a bamboo pen, where eggs are laid during the night. Eggs are collected and sold, or consumed by the herdsman's family.

The major part of the diet of herded ducks consists of whole grain and snails, plus small amounts of insects, leaf material, crabs and frogs. It is the job of the herdsman to move the flock, as often as necessary, to areas where feed is plentiful. Portable fencing and other equipment are moved with the flock to each new location. A grassy area with some protection, such as provided by trees, is selected as a base camp where the fencing is set up. Supplement feed is given to herded ducks only when the feed supply in the fields is inadequate.

Petheram and Tahar (1983) stated that extensive husbandry system can be divided into 4 (four) criteria :

1. Fully mobile

Ducks are always moving around following harvest time of rice field. Farmers do not have a certain place for living; they build shelters not far from the duck confinements. They also build non permanent confinements for the ducks with the fence built around. The distance of moving is usually far enough from one area to the next area, so they have to use transportation tools/vehicles.

## 2. Semi-mobile

The husbandry system is not much different with the fully mobile system, but the farmers have a certain place for living with their family. When ducks go into molting time, the farmers go back to their family until the ducks going back for laying their eggs.

## 3. Home based

Herding system and the moving of the ducks are only following the harvest time around their place/village/the farmer home, and the ducks are not moved to other area with long distance from their place. Ducks allowed herding around dikes, canals, ponds, around the rice-fields areas, etc. Additional feed is provided usually on the post harvest time, such as 'gaplek', corn, broken rice, or rice bran.

## 4. Opportunist

This system usually shows up when the harvest time come, which there is much natural sources of feed. The farmers will buy the ducks before the harvest time come, and then sell them out when the harvest time ended.

Extensive system is carried out since long time ago by generation without much differences in the way of its husbandry practices. One of the characteristic of this system is low production input (production cost) both in supply of feed and confinements. It is also necessary to notice, that output of this system is relatively lower but the time of raising is longer (Suharno and Amri, 1999). Kartika (2003) said that production output of this system only placed 50% of total population laying eggs.

Other weaknesses of the extensive system are very much depending on season and harvest time. Not all farmers applying this system because not all areas in Indonesia have paddy fields. Only in several areas which have large areas of paddy fields are potential for running this extensive system, such in Tegal, Pemalang, Brebes, Boyolali (Central Java) or Subang, Cirebon (West Java) and other areas in Indonesia.

Semi intensive system is mainly semi-commercial or commercial, where ducks are kept in a confinement but still considered the ducks instincts which like very much water. In this system, ducks are free ranging, resting and swimming in the pond in and around the confinement, so they felt like living in a natural environment. Semi intensive system is very common applied by farmers in Indonesia because of very suitable with the characteristics of local ducks. Besides that, this system take lower production cost in comparison with intensive system especially in cost for making confinements (Kartika, 2003).

Confinement as a main characteristic of semi-intensive system usually built in 2 (two) parts, one part for laying egg and another part for playing or free ranging (play ground). The first part has a roof with floor in a land covered by husk or dried rice stalks. While the playing ground is an open area with fence,

also completed with small pond or a pail of water. Sanitation is a key in semi-intensive husbandry because ducks are always kept in a confinement. Manure and waste of feed must be cleaned up for preventing diseases. Pond or water in pail also must be replaced in certain frequency. If all the above measures are done well, semi-intensive system will give much advantages than intensive system.

Samosir (1983) mentioned one good example for semi-intensive system is '*lanting*' system run in Amuntai (South of Borneo). Ducks placed on '*lanting*', kind of floated confinement on rivers or swampy areas. Feed given to the ducks is a material made from sago palm or its product and a snail (*kolumbia*).

Intensive system is mostly commercial where ducks kept in an individual confinement like layer/broiler farming system but without any water area for ducks swimming or playing. There are 3 (three) main points which has to be paid attention when running this system are making of confinements, feeding and prevention of diseases (Kartika, 2003). Type of confinement usually adopted by farmer in this system is battery confinements. The differences between duck battery confinements with chicken battery confinements is normally duck battery confinements are made higher than chicken because of duck neck is longer than chicken.

Confinements made in a row and terraced. Bamboo or wire is a common material use for making battery confinements. Feed with high quality absolutely needed in duck intensive system for giving a good output both in quality and quantity. Management of diseases also must be runned by good biosecurity system. Suharno and Amri (1999) stated that duck productivity with intensive system is higher than duck productivity with extensive or semi-intensive system.

Different breeds of ducks are usually grouped into three classes, as show in table below (Table 3).

**Table 3. General Classification of Ducks**

Type of duck	Breeds	Other Names	Origin	Notes
Egg	1. Indian Runner	Indische Loopend, Indonesian duck	Unknwon	-
	2. Khaki Campbell	-	England	crossbreed of Wild Mallard, the Rouen and the Indian Runner Duck
	3. Buff (Buff Orpington)	The Buff Orpington	England	-
Meat	1. Pekin	-	Tiongkok (Tientsien)	-
	2. Aylesbury	-	Aylesbury, England	Derived from Wild Mallard
	3. Rouen	-	-	Derived from Wild Mallard
	4. Muscovy	Entog, Itik Manila	-	Derived from Brazilian Duck
	5. Cayuga	-	-	Derived from Wild Black Duck ( <i>Anas Obscura</i> ) and common duck
Ornamental / pleasure / hobby	1. East India	-	-	-
	2. Call (Grey Call)	-	-	-
	3. Mandarin	-	-	-
	4. White Crested	-	-	Bred by Profesor Darrel Sheraw in United States
	5. Blue Swedish	-	-	-

Source : Samosir, DJ (1983)

The Indian Runner is a very active breed, native to Asia, and ideal for free-range. It is a very good egg layer and needs less water than most other breeds, requiring only a basin in which it can immerse its beak up to the nostrils. It is the most graceful and elegant of all ducks on land with its upright carriage and slim body. It stands at an angle of about 80° to the ground but when startled can be almost perpendicular (FAO technical guide book, 2004). Many experts stated that original ducks of Indonesia mostly similar with this type (Samosir, 1983).

Based on the purpose of raising ducks (duck production system) in Indonesia, there are 3 (three) types of ducks which are: (1) ducks for eggs production, (2) ducks for meat production and (3) ducks for breeding (Table 4).



**Table 4. Duck breeds well known use in Indonesia**

Purpose of production	Breeds	Main area to be found	Husbandry system usually use *)
Egg	Alabio Duck ( <i>Anas platyrhynchos Borneo</i> )	Amuntai (South Kalimantan)	Semi-intensive Intensive
	Tegal Duck ( <i>Anas javanica</i> )	Tegal (Central Java) Cirebon (West Java) Mostly area in Java which found ducks poultry	Free-range Semi-intensive Intensive
	Mojosari Duck	Mojosari (East Java) Mostly area in East Java which found ducks poultry	Semi-intensive Intensive
	Bali Duck ( <i>Anas sp</i> )	Bali	Semi-intensive Intensive
Meat	Peking Duck	West Java	Semi-intensive Intensive
	Muscovy Duck	Java	Free-range Semi-intensive Intensive
	Tiktok	Sawangan, West Java	Semi-intensive Intensive
Breeding	Alabio Duck ( <i>Anas platyrhynchos Borneo</i> )	Amuntai (South Kalimantan)	Semi-intensive Intensive
	Tegal Duck ( <i>Anas javanica</i> )	Central Java – West Java	Semi-intensive Intensive
	Mojosari Duck	East Java	Semi-intensive Intensive
	Bali Duck ( <i>Anas sp</i> )	Bali	Semi-intensive Intensive

Source : Widjaya, K (2004)

\*) : Husbandry system being use depending on scale of poultry

Ducks for eggs production is the largest number to be runned by farmers in Indonesia. In this type of raising system, farmers can also sale their ducks as meat after production period terminated as culling ducks. In Indonesia, several local ducks which well known as a good ducks for egg production are: Alabio duck (*Anas platyrhynchos Borneo*), Bali duck (*Anas sp*), Tegal duck (*Anas Javanica*) and Mojosari duck (Samosir, 1983). The performance of ducks usually known for egg production show in the Table 5.

**Table 5. The performance of ducks for egg production in Indonesia**

Main Breed	Special Characteristic	Egg production (egg/head/year)	Egg colour
Alabio Duck ( <i>Anas platyrhynchos Borneo</i> )	Many spots of brown on the feather	275	Blue - Gray
Tegal Duck ( <i>Anas javanica</i> )	Brown – Old brown feather	250	Green – Blue green
Mojosari Duck	Bright – smooth brown feather	200 – 260	Green – Blue green
Bali Duck ( <i>Anas sp</i> )	Little crest on the head White/bright feather	250	White

Source : Widjaya, K (2004); Tanujaya (1992)

Species of ducks which are the most famous in egg production is Tegal duck. Tegal duck is a local name for duck in one area in Central Java, but is very common used by all farmers in Java. This duck can go through long distances when herding from one area to other areas, have a vertical body shape as a bottle with height 45-50 cm. Common color of Tegal duck is brownly or many brown spots (called '*branjangan*') with some variation of color as reddish with color of beak and feet are black (Hardjosworo *in* Hartono, 1998). Eggshell color of Tegal duck is green to bluish (Srigandono *in* Tanujaya, 1992).

Other species of Java duck is Mojosari duck with very similar characteristic with Tegal duck. Both species of duck included in one family as Indian runner with have variations on the feathers. In domestication process and different in natural selection then formed a local duck furrow on that area (Mojosari, East Java). Mojosari ducks have feathers with smooth brown to old brown color, either have spots of smooth or old brown color. Mojosari ducks also have neck and leg longer than Tegal duck.

Bali ducks is almost similar with Java duck, except they have a sturdy body and short neck. Body shape is almost vertical, with feather color mostly bright and both of beak and leg are black. Special characteristic of Bali duck is a little crest on the head and white color of the eggshell (Chaves and Lasmini *in* Tanujaya, 1992).

Alabio duck is found in Amuntai, South of Borneo. This duck is different with Bali or Java duck in the way of walk. Alabio duck is not in vertical position but walk in declivity 45°. Feathers color is mostly similar with Tegal duck as many spots of brown and beak also its leg have bright orange to yellow color. The eggshell has bright blue to grayish color (Srigandono *in* Tanujaya, 1992). In intensive system, Tegal duck can produce 212 eggs/head/year, while Alabio duck can produce 200-250 eggs/head/year (Robinson *in* Tanujaya, 1992).

Ducks for meat production commonly comes from a culling duck of duck for egg production has rubbery meat. In Indonesia, there are several duck usually use as duck for meat as Peking duck, Muscovy duck and '*tiktok*' (Kartika, 2003). Although very common as meat duck, ducks mentioned above still have egg production around 100-125 eggs in a year. Therefore this kind of ducks also use as a dual purpose ducks. "*Tiktok*" is cross-bred of male duck (*Anas platyrhynchos*) with female Muscovy duck (*Cairina moschata*). This cross-bred duck is very familiar with local names as *serati*, *beranti*, *togri*, *ritok*, *tongki*, *mandalung* or *pandalungan*. The performance of ducks usually known for meat production show in the Table 6.

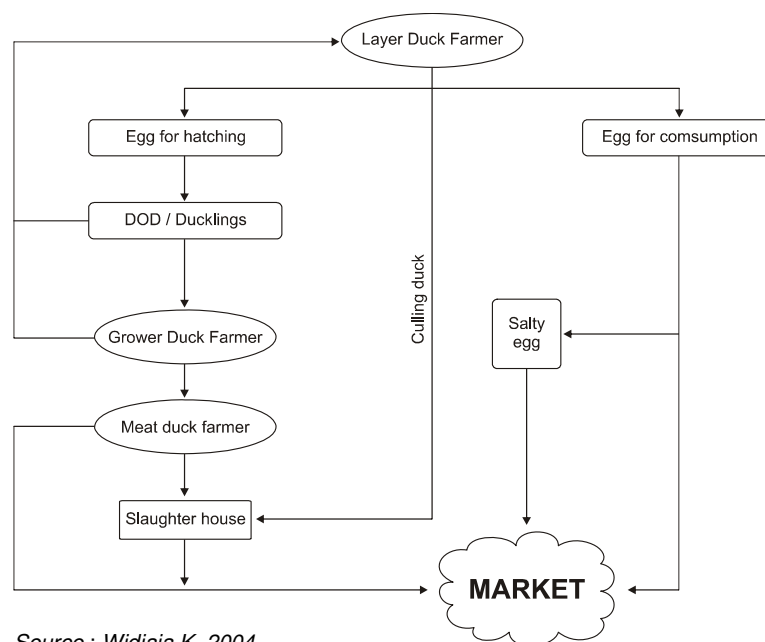
**Table 6. The performance of ducks for meat production in Indonesia**

Main Breed	Age for harvest time	Body weight / head when harvested
Peking Duck	7 – 9 weeks	2.7 – 3 kg
Muscovy Duck	7 – 9 weeks	3.8 – 4.5 kg
Tiktok	6 – 8 weeks	1.5 – 2 kg

*Source : Widjaya, K (2004); FAO technical guide book (2004); <http://balitnak.litbang.deptan.go.id>*

Ducks for breeding purpose is mostly run as a part of business on ducks for eggs or meat productions. In this scale, they only fulfill breeder they needed for run the farm, not for sale. Only big scale or integrated farm has a hatchery that provide breeder for other farm. Scheme of duck production system furrow in the relation with marketing system generally show in the Figure 1.

**Figure 1. Scheme of duck production system furrow in the relation with marketing system generally done in Indonesia**



By-product of ducks commonly use are feathers and manure. Duck feathers can be used for shuttle cock, volumes a pillow, a mattress or a doll also can be use for making a broom or jacket. For making a shuttle cock needed a good quality of feathers such long, white and smooth feathers. Rough feathers can be used for organic fertilizer or part of fowls feed after become feather flour.

Duck manure is commonly used as organic fertilizer for much kind of plants. Samosir (1983) stated that based on chemistry analysis, one ton of duck manure can give result as: 9.99 kg (22 lbs) nitrogen (N), 13.17 kg (29 lbs) phosphoric acid and 4.54 kg (10 lbs) potassium (K).

## **1.2. History of HPAI in Indonesia**

Avian influenza was firstly known to attack poultry livestocks in Indonesia around July – Agustus 2003, almost along with the occurrences of the plague of this disease in several countries in the Asian region covering Thailand, Vietnam, South Korea, Japan, Laos, Cambodia and Pakistan.

Initially, avian influenza cases in Indonesia reported in several commercial poultry farms in West Java and Central Java. The disease afterwards continued to spread in various areas in Central Java, West Java, East Java, DIY, Lampung, Bali and several areas in Sumatra and Kalimantan. Various poultry livestocks like commercial broiler and layer including Grand Parent Stock (GPS) and Parent Stock (PS) Poultry Breeder, the duck, muscovy, quail, and dove were known to be attacked by this avian influenza disease.

After the first case, the spreading of avian influenza cases in Indonesia become very fast. During 2003 this disease was known attacked 9 provinces that consisted of 51 District with the number of deaths of the poultry reached 4.13 million heads (the Indonesian Directorate General of Livestock Services, 2004). At the end of December 2005 this disease had been spread to 24 provinces included 155 District. Untill this period the number of deaths of the poultry was estimated to reached 10.45 million heads. Apart from this direct loss, the AI plague also had the impact of extraordinary economic loss on the Indonesian poultry livestock sector.

The picture of the economics loss of 2003-2004 period covered the 57,9% decline in broiler DOC's demand and 40,4 % in layer. Poultry feed's demand decline 45% and 52,6% in egg supplies. Broiler supplies decline 40,75 % and 39,5% decline in the work opportunity (the FAO Data, 2004).

Results of the field study in a manner of clinical, pathological and laboratories was carried out and proved that the cause of the poultry death since 2003 was the Influenza Virus type A, sub-type H5N1. This virus was classified as the Highly Pathogenic avian influenza (HPAI) virus as one of the zoonotic diseases. The originally AI that only attacked the poultry afterwards began to attack humankind.

The uniqueness of the AI cases in human in Indonesia was the case precisely happened by the time of the cases in poultry have been controlled. Since the first human case in July 2005 in the Banten province, this illness continued to claim casualties until causing the death of total 22 people at the end of March 2006. The Case Fatality Rate (CFR) resulting from human cases in

Indonesia at this time was that highest in the world which reached 73,3 %. This figure was higher compared with the general cases in the world that only reached 53,3 % (FAO, 2004).

### 1.3. Avian Influenza Cases in Duck

Since the beginning of the incident until now the most AI cases in Indonesia reported happened to the chicken livestock. Until today, the case report in the duck livestock never officially has been reported. But several investigation of the AI cases in the duck was done by the Disease Investigation Center, Wates in 6 District in the Java Island during 2004 by doing inspection sample of the cloacal swab. Results of this inspection could be seen in the table's below (Table 7).

**Table 7. The result of the sample of the duck cloacal swab in six (6) district in the Javanese Island**

No	District	Number of Farmer	Number of Sample	Test Result
1	Majalengka	1	6	Negative
2	Cirebon	10	30	Negative
3	Pekalongan	3	9	Negative
4	Brebes	16	48	Negative
5	Tasikmalaya	3	9	Negative
6	Ciamis	5	15	Negative

The Disease Investigation Center also carried out the inspection of the sample of the duck that was sent from various areas in Java Island in 2004. Results of the inspection showed from 43 samples that were accepted evidently 9 samples (21%) was stated AI positive, 6 samples (14%) was AI expected and 28 samples (65%) the AI negative. The data produced from the inspection by Veterinary Inspection Center showed that for the 2004 period the AI virus began to attack the duck livestock.

The nonexistence of the report on the clinical case of the AI disease in the duck livestock for the 2004's period could give the indication that the ducks in the territory that was checked kept towards the AI virus. The positive results in the sample inspection that was checked reinforce the duck statement as the bearer (carier) of the AI virus.

During 2005 the serological study towards the existence of the AI virus in poultry was done by all the Faculty of Veterinary Medicine in Indonesia which covered all the Indonesian territory. The data produced by the serologic

inspection on the AI disease in the duck livestock in several provinces in Indonesia that was received from this study was as follows (Table 8).

**Table 8. The results of AI serology inspection of in the duck in several provinces in Indonesia**

No.	Province	Number of Sample	Number of Positive Results	Percentage	University
1	Lampung	352	157	44,60	Faculty of Veterinary Medicine, Bogor Agricultural University
2	Bengkulu	204	17	13,24	
3	South Sumatera	83	3	3,61	
4	North Sumatera	48	5	10,42	
5	West Sumatera	291	2	0,69	
6	Jambi	76	6	7,89	
7	Bangka Belitung	111	30	27,03	
8	West Kalimantan	208	0	0	
9	Central Kalimantan	36	1	2,78	
10	South Kalimantan	241	18	7,47	
11	East Kalimantan	79	0	0	
12	Central Java, East Jawa, Yogyakarta	3779	291	7,7	Faculty of Veterinary Medicine, University of Gajahmada

This data gave the picture of the duck livestock in 9 of 10 provinces in Sumatera and Kalimantan region are infected with AI virus with various percentage from 0 to 44,6%. This data also showed that the territory up until now was known as the pocket of the AI disease in the chicken livestock, like the Lampung province, evidently pointed out a high percentage of avian influenza occurrence on duck livestock.

This data could reinforce the assumption that the duck might have the important role in spreading AI disease to the chicken livestock in Indonesia. The sorting of the data produced by the serological survey was based on the free territory and the AI endemic territory showed evidently most AI endemic territories showed positive occurrence of AI virus in the duck, except the Bangka Island territory that geographically separated naturally by the ocean.

## **II. RATIONAL OF THE STUDY**

It is well known that ducks was one of the aquatics birds who act as a natural reservoir for all influenza viruses. In aquatics birds, influenza viruses replicate predominantly in the intestinal tract and are shed by fecal oral transmission often through water. In the relation with that fact, the free range farming system have a high possibility to play an important role in spreading influenza viruses because of the movement of ducks from one area to other areas.

## **III. OBJECTIVE OF THE STUDY**

The main objective of the study is to learn more about the free-range duck farming systems in Indonesia and understand better their role in the possible transmission of HPAI. The study will also identify additional knowledge gaps that will require investigation and make preliminary recommendations on practical husbandry related control measures

## **IV. METHODOLOGY**

The study bases on four main sources of information as follows :

1. Secondary data from documents provided by the districts.
2. Primary data obtained from the districts by interviewing district officers using questionnaire.
3. Primary data from farms/producers by interviewing farmers directly using questionnaire.
4. Literature research through searching literatures in libraries and browsing internet.

### **4.1. Location of the Study**

Steps in identifying the locations of the study :

1. Collect Information on main free-range duck areas
2. Determine provinces and districts as the study locations
3. Conduct pre survey to the district to collect secondary data
4. Identify sub-district based on the interview with district livestock officers.
5. Identify villages as well as farmer/producers defined as the 'respondent' from each sub-district.

Based on the result of information collected, there had been 5 (five) districts identified as the study locations which are show on Table 9 and Figure 1.

**Table 9. The five (5) districts identified as the study location of the survey**

No.	Province	District
1.	Banten	Tangerang
2.	West Java	Subang
3.	West Java	Cirebon
4.	Central Java	Brebes
5.	Central Java	Pemalang

**Figure 2. Location of the study**



There will be 3 sub-districts in each district chosen as the sampling areas. The objective is to interview 10 farmers as 'respondent' in each sub-district. The total number of farmers interviewed is 30 in each sub-district. The total number of farmers as 'respondent' then is 150, which is representative of the duck farming system in Indonesia and which will allow to perform statistical analysis of the data.



## 4.2. Organization of the study

The field survey was done in two steps. The first step is the pre survey to describe the duck farming systems within the district and second step is to describe the production system at the farm/producer level.

### 4.2.1. Pre Survey

This first part of the survey based on interviews with relevant stakeholders at the district using questionnaire Form A (see Annex 1). The objective is to describe and assess the relevance of duck production system within the district, to assess the importance of various types of duck farming systems, and to assess the implementation of disease control measures within those districts.

The schedule of pre survey was conducted between the second and the third week of January 2006 as show on the table below.

**Table 10. Schedule of pre survey**

Date of Survey	Location of Survey
January 12, 2006	Tangerang Brebes
January 13, 2006	Pemalang
January 16, 2006	Cirebon
January 17, 2006	Subang

The questionnaire is in Indonesian language and will be tested to a few of respondents during the pre survey.

### 4.2.2. Farmers Interview

This second part of the survey based on interviews with selected duck farmer respondent at village level. The farmers will be chosen based on discussions with district livestock officer and people at the village level. Every farmer will be interviewed using questionnaire Form B (see Annex 2).

The questionnaire for selected farmers will be conducted between the fourth week of January 2006 up to the first week of February 2006. Interview in each district will be done by a team of 'enumerators' consist of 2 (two) persons, and accompanied by one district officer.

The questionnaire used in the interview is divided into 5 (five) parts as follows :

- Part 1 : Characterization of farmer
- Part 2 : Husbandry system
- Part 3 : Production system
- Part 4 : Health management
- Part 5 : Marketing system

## V. SCHEDULE OF THE STUDY

**Table 11. Schedule of the study**

Activity	Dec 2006	Jan 2006					Feb 2006				March 2006	
	Week											
	3	4	1	2	3	4	1	2	3	4	1	2
Drafting questionnaires and searching literatures												
Preparation field team and Information collection												
Pre survey and testing questionnaire												
Farmers interview												
Data analysis												
Drafting the report												
Submission of final report												

## VI. RESULTS AND DISCUSSION

### 6.1. Description of Free Range duck in the Study Area

#### 6.1.1. General Picture of District Location Questionnaire Survey

##### 1. Pemalang

District of Pemalang consists of 14 sub-districts and 222 villages. Topography area of Pemalang District divided into two area, which are beach or coastal area (1-13 m above sea level) and mountainous area (14-914 m above sea level). Three areas used for questionnaire survey in this study are Petarukan

sub-district, Taman sub-district dan Randudongkal sub-district. Petarukan and Taman sub-district are in the coastal areas, while Randudongkal sub-district is in the mountainous area.

Populaton of ducks in Pemalang distributed in all sub-district areas. The population of ducks in coastal area almost equal with its in hilly area. Based on data provided by district, total ducks population in 2005 is 305,710 heads which is 15% of total fowls population in Pemalang.

## **2. Brebes**

District of Brebes consists of 17 sub-districts, 192 villages and 4 subvillages (a political area which are almost similar with village and administered by the lurah). On the north side, District of Brebes is limited by sea of Java, by District of Banyumas and Cilacap on the south side, on east side limited by Municipality of Tegal, and limited by District of Kuningan and Cirebon on west side. According to the geographical, District of Brebes lay on 41° 37.7' - 109° 11' 28.92" East Longitude and 6° 44' 56.5" - 7° 20' 51.48" South Latitude.

In general, topography condition of Brebes district is sideways to north goes in the direction sea of Java, and can be classified into 3 topography area, which are : (1) Lowland area to slope slightly area : lay on north area to the beach of Sea of Java with 3-10 m above sea level of height; (2) Wavy area : lay on the mid area between lowland area (north area) and mountainous area (south area ); (3) Mountainous area : lay on south area to the border of Banyumas and Cilacap district with height until 875 m above sea level.

Brebes is one of district in Indonesia which is very famous with duck eggs production for comsumption such as salty egg. Based on secondary data provided by district (year of 2004), population of ducks in Brebes grew from 2000 to 2003 : 831,330 heads (2000), 847,956 (2001), 852,196 (2002) and 874,466 (2003). This number is the highest population in comparison with other kinds of fowls since 2000 to 2002. Started in year of 2003, the number of ducks population almost similar with chicken (broiler and layer) population.

## **3. Cirebon**

District of Cirebon is the area with coastal area on one part and mountainous area in other part. Most of communities are farmer. Cirebon district area bordered by Indramayu district on the north, by Kuningan district on the south, Majalengka district on the west and on the east area bordered by Brebes district. Administratively, District of Cirebon divided into 27 sub-districts and 424 villages.

Cirebon is district which is also very famous with duck eggs production on coastal area. On the first generation of farmers, mostly of them do the extensive

system along the beach. In recent time, farmers mostly do the intensive and semi-intensive system husbandry. Majority of farmers formed a group of farmers. Total population of ducks in 2005 is 274,452 heads.

#### **4. Subang**

District of Subang as administrative area consists of 22 sub-districts. Besides have 244 villages, Subang district has 4 subvillage. According to the geographical, Subang district bordered by beach of sea of Java on the north, Bandung district on the south, Purwakarta and Karawang on the west, also Sumedang and Indramayu district on the east. Topography area of Subang divided into 3 areas : (1) Mountainous area (500-1,500 m above sea level) with 41,035.09 hectare of wide which is 20% out of total district area, (2) Wavy and hilly area (50-500 m above sea level) with 71,502 hectare of wide which is 35.85% out of total district area, and Lowland area (0-50 m above sea level) with 92,939.7 hectare which is 45.15% out of total district area.

Duck population of Subang District mostly distributed on areas with wide of rice-fields although based on data provided by district show that all sub-district area have a present of ducks. Total population of ducks in 2005 is 485,090 heads.

#### **5. Tangerang**

District of Tangerang laid on 105° 1' 11" – 106° 7' 12" East Longitude. According to the geographical, Tangerang district limited by Sea of Java on the north, Bogor district area on the south, District of Serang on the west, also Tangerang Town and DKI Jakarta on the east. As administrative area, District of Tangerang consists of 26 sub-districts and 348 villages.

Based on data of Agricultural Census (2003), ducks population in Tangerang District distributed on all sub-district area but concentrated mostly in coastal area and hilly area with many rice-field areas. Total ducks populations in 2003 is 714,300 heads which is only 11% of total chicken (native and commercial chicken) in Tangerang.

##### **6.1.2. Result of Farmer's Questionnaire**

Based on result of questionnaire survey carried out on 150 duck farmers in 5 districts, most of interviewed farmers (respondent ) (86%) get the source of feed for the duck by herding them and give them additional feed (free range with additional feed). Only 10% or 15% out of the total respondent giving feed for their ducks by herding them only without giving any additional feed (free range - scavenging system). There are 6 respondent (4%) who do not herd their ducks

anymore, put the duck in the colony confinements with yard for free range area, and give them feed everyday (free range in the confinement) (Table 12).

Related to the three different husbandry systems mentioned on the first page, free range - scavenging system is mostly similar with the extensive system while both free range with additional feed and fully feeding without herding outside the confinement are included into semi-intensive system. As Gilbert et al (2006) stated that areas where both extensive and semi-intensive poultry production systems coexist were believed to be particularly at risk in context of spreading of HPAI.

**Table 12. Percentages of duck feed resources of total respondent**

No	Duck feed resource	Frequency ( N )	Percentage ( % )
1	Free range - scavenging system	15	10
2	Free range with additional feed	129	86
3	Fully feeding (Free-range in the yard of confinement)	6	4
T o t a l		150	100

If we compare with the general percentage, majority of farmers on each district area preferred to herd and give an additional feed as feed resource of ducks. All respondents in Cirebon dan Tangerang Districts chosen to herd and give additional feed for their ducks. In Brebes, 80% of total respondents choose to herd and give additional feed, only 6 interviewed farmers still do the scavenging system.

On Pemalang and Subang districts, majority of respondents also get the feed for their ducks by herding and giving an additional feed (60% for Pemalang, 90% for Subang), and also found the variety which is farmers do not herding the duck anymore although they ever do that system on the past (13.3% for Pemalang, 6.7% for Subang). They put their ducks in the colony confinement and feeding them everyday. Only 1 farmer on Subang district and 8 farmers on Pemalang district still do the scavenging system. A percentage of three groups of farmer based on the duck feed resources on each district area is given by Table 13.

**Table 13. Three different groups of farmer based on the resource of duck feed in each district area**

No	Duck Feed resource	Pemalang		Brebes		Cirebon		Subang		Tangerang		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Free range - scavenging system	8	26.7	6	20	-	-	1	3.3	-	-	15	10
2	Free range with additional feed	18	60	24	24	30	100	27	90	30	100	129	86
3	Fully feeding	4	13.3	-	-	-	-	2	6.7	-	-	6	4
	TOTAL	30	100	30	100	30	100	30	100	30	100	150	100

### 1. Respondent/Farmer Characterization

The majority of total respondents are male (94.7%) and 8 out of them are female (5.3%). This proportion can be explained that men are the head of family who are responsible in searching income through duck farming. Most farmer interviewed are in productive ages (92%), which is between 20-60 years old. Only 7 out of total respondents (4.7%) are more than 60 years old, and only 5 respondent (3.3%) are less than 20 years old.

Level of education of respondents are vary from not formally educated at all up to as high as college level. Most respondents (59.3%) had formal education up to elementary school, other respondents had level of education until junior high school (12%) and senior high school (11.3%). Only 1.3% of total respondents (only 2 farmers) continued their education until college level, while 24 respondents are farmers without any formal education.

The highest percentage of respondents who has the longest experiences of duck farming of more than 10 years are represented by farmer groups who never get formal education and only get education until elementary school (66%). This fact can be explained because duck farming in these farmer groups play as main income resources of respondents which has been done for many years and taught in the family by generation.

Duck farming by majority of respondent (84.7%) became their main bussiness or source of income to fulfil all needs in their life. Beside as a duck farmer, most of respondents have other side job as a rice field farmer (42%), while almost same percentage of respondents show that they have no side job. The remaining small percentage of respondents have a side job as an entrepreneur in agricultural field, field labourer, artisan, trader and government employee. All farmers interviewed mentioned that they are the owner of the duck farm which they run (100%) and also as a worker on the farm or hiring another person to help run the farm.

In general, the characterizations of respondents do not show any differences within district. All information about respondent's characterizations show in Table 14.

**Table 14. Respondents characterizations in each district area**

No	Respondent caharacterization	Pemalang		Brebés		Cirebon		Subang		Tangerang		T o t a l	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Sex :												
	▪ Male	27	90	29	96.7	27	90	29	96.7	30	100	142	94.7
	▪ Female	3	10	1	3.3	3	10	1	3.3	-	-	8	5.3
	T o t a l	30	100	30	100	30	100	30	100	30	100	30	100
2	Age :												
	▪ < 20 years old	-	-	-	-	-	-	2	6.7	3	10	5	3.3
	▪ 20-60 years old	27	90	27	90	29	96.7	28	93.3	27	90	138	92
	▪ > 60 years old	3	10	3	10	1	3.3	-	-	-	-	7	4.7
	T o t a l	30	100	30	100	30	100	30	100	30	100	30	100
3	The last education level :												
	▪ No formal education	6	20	1	3.3	1	3.3	12	40	4	13.3	24	16
	▪ Elementary school / equal	22	73.3	19	63.3	21	70	10	33.3	17	56.7	89	59.3
	▪ Junior high scholl / equal	1	3.3	4	13.3	3	10	3	10	7	23.3	18	12
	▪ Senior high scholl / equal	1	3.3	4	13.3	5	16.7	5	16.7	2	6.7	17	11.3
	▪ College / equal	-	-	2	6.7	-	-	-	-	-	-	2	1.3
	T o t a l	30	100	30	100	30	100	30	100	30	100	150	100
4	Experiences of farming :												
	▪ < 1 years	-	-	-	-	-	-	4	13.3	1	3.3	5	3.3
	▪ 1-2 years	-	-	2	6.7	1	3.3	7	23.3	2	6.7	12	8
	▪ 3-5 years	1	3.3	5	16.7	3	10	4	13.3	4	13.3	17	11.3
	▪ 6-10 years	3	10	4	13.3	2	6.7	4	13.3	4	13.3	17	11.3
	▪ > 10 years	26	86.7	19	63.3	24	80	11	36.7	19	63.3	99	66
	T o t a l	30	100	30	100	30	100	30	100	30	100	30	100
5	Type of business :												
	▪ Main	28	93.3	27	90	30	100	24	80	18	60	127	84.7
	▪ Additional	2	6.7	3	10	-	-	6	20	12	40	23	15.3
	T o t a l	30	100	30	100	30	100	30	100	30	100	30	100
6	Other job :												
	▪ Enterpreuneur	-	-	3	10	2	6.7	2	6.7	1	3.3	8	5.3
	▪ Government employee / military employee	2	6.7	-	-	-	-	-	-	-	-	2	1.3
	▪ Private company employee	-	-	1	3.3	-	-	-	-	-	-	1	0.7
	▪ Field farmer	5	16.7	11	36.7	24	80	11	36.7	12	40	63	42
	▪ An artisan	-	-	1	3.3	-	-	-	-	-	-	1	0.7
	▪ Others	2	6.7	5	16.7	1	3.3	3	10	13	43.3	24	16
	▪ No side job / other job	21	70	9	30	3	10	14	46.7	4	13.3	51	34
	T o t a l	30	100	30	100	30	100	30	100	30	100	30	100
7	Ownership :												
	▪ Owner	30	100	30	100	30	100	30	100	30	100	30	100
	T o t a l	30	100	30	100	30	100	30	100	30	100	30	100

Based on duck feed resources, there is no difference found on respondent's characteristic between each group, except if it is imply to the sex of farmers. All respondents who do the scavenging system are male (15 farmers, 100%). Majority of respondents who herd and give an additional feed to ducks are also male (96.1%), while the same proportion between male and female shown on group of respondent who give feed to ducks everyday without herding

them around (50% for male, 50% for female). This is possible to happen because on fully feeding system (without herding ducks around), female workers can handle ducks better compare to with herding system (both on free range - scavenging system and on free range with additional feed). On both types of system mentioned lastly, male workers are more dominant because they must herd the ducks around and move them from one area to other area.

On three types of duck feed resources, majority of respondent also in the productive age, have an elementary level in formal education or never get formal education and have more than 10 years experiences in duck farming. All respondent mentioned that they are the owner of the duck farm, and some of them also as a worker. Figure of respondent characterization based on duck feed resources are shown in Table 15.

**Tabel 15. Respondents characterizations based on duck feed resources**

No	Respondent characterization	Free range - scavenging system		Free range with additional feed		Fully feeding		Total	
		N	%	N	%	N	%	N	%
1	Sex :								
	▪ Male	15	100	124	96.1	3	50	142	94.7
	▪ Female	-	-	5	3.9	3	50	8	5.3
	T o t a l	15	100	129	100	6	100	150	100
2	Age :								
	▪ < 20 years old	-	-	5	3.9	-	-	5	3.3
	▪ 20-60 years old	14	73.3	118	91.5	3	50	138	92
	▪ > 60 years old	1	6.7	6	4.7	3	50	7	4.7
	T o t a l	15	100	129	100	6	100	150	100
3	The last education level :								
	▪ No formal education	4	26.7	19	14.7	1	16.7	24	16
	▪ Elementary school / equal	9	60	76	58.9	4	66.7	89	59.3
	▪ Junior high scholl / equal	1	6.7	16	12.4	1	16.7	18	12
	▪ Senior high scholl / equal	1	6.7	16	12.4	-	-	17	11.3
	▪ College / equal	-	-	2	1.6	-	-	2	1.3
	T o t a l	15	100	129	100	6	100	150	100
4	Experiences of farming :								
	▪ < 1 years	-	-	3	2.3	2	33.3	5	3.3
	▪ 1-2 years	-	-	12	9.3	-	-	12	8
	▪ 3-5 years	3	20	14	10.9	-	-	17	11.3
	▪ 6-10 years	1	6.7	15	11.6	1	16.7	17	11.3
	▪ > 10 years	11	73.3	85	65.9	3	50	99	66
	T o t a l	15	100	129	100	6	100	150	100
5	Type of business :								
	▪ Main	15	100	109	84.5	3	50	127	84.7
	▪ Additional	-	-	20	15.5	3	50	23	15.3
	T o t a l	15	100	129	100	6	100	150	100
6	Other job :								
	▪ Entrepreneur	-	-	8	6.2	-	-	8	5.3
	▪ Government employee / military employee	-	-	1	0.8	1	16.7	2	1.3
	▪ Private company employee	-	-	1	0.8	-	-	1	0.7
	▪ Field farmer	6	40	55	42.6	2	33.3	63	42
	▪ An artisan	-	-	1	0.8	-	-	1	0.7
	▪ Others	1	6.7	22	17.1	1	16.7	24	16
	▪ No side job / other job	8	53.3	41	31.8	2	33.3	51	34
	T o t a l	15	100	129	100	6	100	150	100
7	Ownership :								
	▪ Owner	15	100	129	100	6	100	129	100
	T o t a l	15	100	129	100	6	100	150	100



## **2. Husbandry System**

### **A. Kind of species, Number of animal and Origin of ducks**

Majority of duck species reared by respondents is Javanese duck (80.7%) with vary in number of ownership. More than half of total respondents mentioned own 100-500 heads of duck (65.3%). Higher number of ownership is 501-1000 heads (16.7%), and only 6% respondent own more than 1000 heads of duck. Generally the result are same in each district area. Majority of respondent in each district area prefer Javanese duck, only in Tangerang district show higher percentages of respondent prefer mixed duck( 63.3%). The number of duck in each district area are not significantly different, most of respondent have 100-500 heads of duck.

Generally, duck breeds reared by respondents obtained by buying from other farmer around the village (43.3%), from other sub-district or district, or from other province (49.3%). The other farmer mention is usually as a middleman, collector, and suddenly as a buyer-up. Almost the same condition found in each district area, for exception in Brebes, 2 respondent answered they get the breed from breeding farm organized by district livestock services and Centre for Livestock Breeding (BPPT ).

More than a half of total respondents mentioned that they are rearing the duck in the same age (63.3%), while the left respondents keep ducks in various of age (36.7% ). Farmers who reared their duck in remaining the same age mostly wait until all of their ducks sold out then buying for new ducks (all in – all out system), so they never have different age of ducks. Farmers who reared ducks in various of ages are usually do not wait for their duck until culling period to buy a new duck, so there's always a different age of duck at the same time.

The same condition also found in District of Brebes, Cirebon and Subang; while more than a half of respondents in Pemalang and Tangerang (Pemalang = 53.3%, Tangerang = 63.3%) answered they reared their ducks in various of ages. The variation of age usually consists of 2 or 3 variations, which are ducklings, adult duck/breeder, duck at culling period/have passed the peak of production period. The treatment to different age of ducks by mostly respondents is perfectly separated (58.9%). Different condition found in District of Tangerang and Subang where farmers mixed their ducks with different age in the same colony (Tangerang = 89.5%, Subang = 66.7%).

Majority of total respondents (98.7%) use male duck in the colony less than 5% of total duck number. Only 1 respondent from District of Brebes use male with ratio number more than 5%, or more than 10%. The presence of male duck in the colony of female ducks have purpose for giving secure feeling in the colony. As a leader of the female colony, male duck also improve increasing the female productivities.

Besides rearing the duck, most respondents also reared other fowls or mammals around the house, including muscovy duck, pigeon, geese, broiler, layer, quail, sheep, goat, buffalo and cow. Confinements of other animal mentioned above vary to the position of the duck confinements. Some of the confinements are close enough to the duck confinements, other separated perfectly with certain distance, and also there are unconfinements ( free range ) then mixed, eat and play with ducks in the same confinement. Figure of ducks variation reared by respondents in each district area show on Table 16.

**Tabel 16. Figure of ducks variation reared by respondents in each district area**

No	Classification	Pemalang		Brebes		Cirebon		Subang		Tangerang		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Kind of duck reared :												
	▪ Javanese	28	93.3	29	96.7	28	93.3	25	83.3	11	36.7	121	80.7
	▪ Mixed	2	6.7	1	3.3	2	6.7	5	16.7	19	63.3	29	19.3
	Total	30	100	30	100	30	100	30	100	30	100	150	100
2	Breeds origin :												
	▪ Own breeding farm	2	6.7	1	3.3	2	6.7	3	10	-	-	8	5.3
	▪ Other farmer around the village / area	8	26.7	4	13.3	15	50	20	66.7	18	60	65	43.3
	▪ Farmer from other area	20	66.7	23	76.7	13	43.3	7	23.3	11	36.7	74	49.3
	▪ Market/live market	-	-	-	-	-	-	-	-	1	3.3	1	0.7
	▪ Other	-	-	2	6.7	-	-	-	-	-	-	2	1.3
	Total	30	100	30	100	30	100	30	100	30	100	30	100
3	Number of ownership (heads) :												
	▪ < 100	-	-	4	13.3	-	-	4	13.3	10	33.3	18	12
	▪ 100-500	24	80	16	53.3	20	66.7	19	63.3	19	63.3	98	65.3
	▪ 501-1000	5	16.7	8	26.7	6	20	6	20	-	-	25	16.7
	▪ > 1000	1	3.3	2	6.7	4	13.3	1	1	1	3.3	9	6
	Total	30	100	30	100	30	100	30	100	30	100	150	100
4	Variation of duck age kept :												
	▪ The same age	14	46.7	20	66.7	23	76.6	27	90	11	36.7	95	63.3
	▪ Variation on age	16	53.3	10	33.3	7	23.3	3	10	19	63.3	55	36.7
	Total	30	100	30	100	30	100	30	100	30	100	150	100
5	Treatment to different age of ducks :												
	▪ Mixed	-	-	3	42.8	-	-	2	66.7	17	89.5	23	41.1
	▪ Separated perfectly	16	100	7	57.2	7	100	1	33.3	2	10.5	33	58.9
	Total	16	100	10	100	7	100	3	100	19	100	55	100
6	% male in the colony :												
	▪ < 5 %	30	100	28	93.3	30	100	30	100	30	100	148	98.7
	▪ 5-10 %	-	-	1	3.3	-	-	-	-	-	-	1	0.7
	▪ > 10 %	-	-	1	3.3	-	-	-	-	-	-	1	0.7
	Total	30	100	30	100	30	100	30	100	30	100	150	100

Based on duck feed resources (Table 17), majority of respondents in each group also reared Javanese duck, with 100-500 heads of ownership and get the duck breeder from the other farmer around the village or other area who also suddenly act as a buyer-up or middleman. Most respondents also use the ratio of male less than 5%, reared the duck in the same or various age and reared separately different age of ducks.

**Tabel 17. Figure of ducks variation reared by respondents based on duck feed resources**

No	Classifications	Free range – scavenging system		Free range with additional feed		Fully feeding		T o t a l	
		N	%	N	%	N	%	N	%
1	Kind of duck kept :								
	▪ Javanese	15	100	101	78,3	5	83,3	121	80,7
	▪ Mixed	-	-	28	21,7	1	16,7	29	19,3
	T o t a l	15	100	129	100	6	100	150	100
2	Breeds origin :								
	▪ Own breeding farm	-	-	8	6,2	-	-	8	5,3
	▪ Other farmer around the village / area	2	13,3	61	47,3	2	33,3	65	43,3
	▪ Farmer from other area	13	86,7	57	44,2	4	66,7	74	49,3
	▪ Market/live market	-	-	1	0,8	-	-	1	0,7
	▪ Other	-	-	2	1,6	-	-	2	1,3
	T o t a l	15	100	129	100	6	100	150	100
3	Number of ownership (heads) :								
	▪ < 100	1	6,7	15	11,6	2	33,3	18	12
	▪ 100-500	11	73,3	85	65,9	2	33,3	98	65,3
	▪ 501-1000	3	20	20	15,5	2	33,3	25	16,7
	▪ > 1000	-	-	9	7	-	-	9	6
	T o t a l	15	100	129	100	6	100	150	100
4	Variation of duck age kept :								
	▪ The same age	12	80	80	62	3	50	95	63,3
	▪ Variation on age	3	20	49	38	3	50	55	36,7
	T o t a l	15	100	129	100	6	100	150	100
5	Treatment to different age of ducks :								
	▪ Mixed	1	33,3	21	42,8	-	-	22	40
	▪ Separated perfectly	2	66,7	28	57,2	3	100	33	60
	T o t a l	3	100	49	100	3	100	55	100
6	% male in the colony :								
	▪ < 5 %	15	100	127	98,4	6	100	148	98,7
	▪ 5-10 %	-	-	1	0,8	-	-	1	0,7
	▪ > 10 %	-	-	1	0,8	-	-	1	0,7
	T o t a l	15	100	129	100	6	100	150	100

## B. Herding System ( Free-Ranging System )

Most of herding system or free-ranging system adopted by interviewed farmers on all districts were runned following the harvest time of rice-field (61.8%) and not during all seasons. Herding system have a close relationship with the way of respondents get the duck feed (sources of duck feed).

Most of respondents who are doing herding system do the activity everyday, start around 06.00-07.00 AM and finished around 05.00-06.00 PM. Variations between districts only shown the movement distance when herding system runs. The distance of moving is very much depends on supply of natural resources/natural feed on post harvest in each district.

In the District of Pemalang and Subang, the majority of farmers moving within one district (Pemalang = 46.2%, Subang = 39.3%), means they move from one paddy fields to another paddy fields for herding ducks within one district. In District of Brebes, mostly respondents (40.0%) move from one herding area to another area across the district within one province. Highest percentage found in District of Cirebon (40.0%) where interviewed farmers move across the province, while majority of the District of Tangerang respondents only move within one village (70.0%).

The way to move from one area to other area is very much depends on the distance of moving. If the distance of movement is far enough like the majority of respondents in the District of Pemalang and Subang, the movement usually done by transportation facilities such as truck or other vehicles. When the distance of moving is close enough, for example only within the village, found in the majority of Tangerang district respondents (76.7%), then the moving done only by driving ducks to the new herding area.

Within moving from one area to other area, some of respondents ever passed through other livestock farm or other places of ranging fowls or mammals, such as chickens, sheep, goat, cow, buffalo, Muscovy duck, geese, or pigeon. Ducks never intended to be herds on the same area with other fowls or mammals. Accidentally a duck being on the same area of post harvest paddy fields, such as together with chickens belong to the owner of the area, or together with buffalo ploughs the field.

Most of interviewed farmers who done herding system mentioned they do not need to pay the area used for herding (not rent). Usually, respondents give 1-2 eggs to the owner of herding area as the way to thank for using their post-harvest paddy- field. Some respondents give it once in 2 days; others give once in 3 days, or once in a week, depend on their duck's productivity. A few of farmers give a money around Rp. 10.000,- to Rp. 50.000,- as replacement fee for using the field area for herding ducks (Table 18).

**Tabel 18. Herding system done by respondents in each district area**

No	Classifications	Pemalang		Brebés		Cirebon		Subang		Tangerang		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Time of herding :												
	▪ All season, depend on paddy-rice cycle / harvest time	9	34.6	12	40	17	56.7	10	35.7	-	-	48	33.3
	▪ All season, not depend on paddy-rice cycle	-	-	-	-	-	-	5	17.9	-	-	5	3.5
	▪ Depend on paddy-rice cycle, not all season	17	65.4	16	53.3	13	43.3	13	46.4	30	100	89	61.8
	▪ Depend on season / weather	-	-	2	6.7	-	-	-	-	-	-	2	1.4
	Total	26	100	30	100	30	100	28	100	30	100	144	100
2	Frequency of herding :												
	▪ Everyday	25	96.2	27	90	29	96.7	22	78.6	30	100	133	92.4
	▪ Once in 2 days	-	-	2	6.7	-	-	-	-	-	-	2	1.4
	▪ Not certain time	1	3.8	1	3.3	1	3.3	6	21.4	-	-	9	6.3
	Total	26	100	30	100	30	100	28	100	30	100	144	100
3	Start of herding :												
	▪ 06.00 am – 07.00 am	15	57.6	9	30	22	73.3	22	78.6	21	70	89	61.8
	▪ 8.00 am – 09.00 am	11	42.4	21	70	8	26.7	6	21.4	9	30	55	38.2
	Total	26	100	30	100	30	100	28	100	30	100	144	100
4	End of herding :												
	▪ 12.00 am	-	-	2	6.7	-	-	-	-	-	-	2	1.4
	▪ 03.00 pm – 04.00 pm	10	38.5	22	73.3	17	56.7	15	53.6	8	26.7	72	50
	▪ 05.00 pm – 06.00 pm	16	61.5	6	20	13	43.3	13	46.4	22	73.3	70	48.6
	Total	26	100	30	100	30	100	28	100	30	100	144	100
5	Movement distance :												
	▪ Moving within 1 village	-	-	2	6.7	-	-	4	14.3	21	70	27	18.8
	▪ Moving within 1 sub-district	9	34.6	10	33.3	9	30	5	17.9	7	23.3	40	27.8
	▪ Moving within 1 district	12	46.2	2	6.7	4	13.3	11	39.3	2	6.7	31	21.5
	▪ Moving within 1 province	4	15.4	12	40	5	16.7	6	21.4	-	-	27	18.8
	▪ Moving across the province	1	3.8	4	13.3	12	40	2	7.1	-	-	19	13.2
	Total	26	100	30	100	30	100	28	100	30	100	144	100
6	The way to move :												
	▪ By vehicles / transportation tools	21	80.8	16	53.3	12	40	12	42.9	2	6.7	63	43.8
	▪ By driving the duck	1	3.8	3	10	-	-	4	14.3	23	76.7	31	21.5
	▪ Mixed	4	15.4	11	36.7	18	60	12	42.9	5	16.7	50	34.7
	Total	26	100	30	100	30	100	28	100	30	100	144	100
7	How to get herding area :												
	▪ Rent	-	-	2	6.7	3	10	2	7.1	-	-	7	4.9
	▪ Not rent	26	100	28	93.3	27	90	26	92.9	30	100	137	95.1
	Total	26	100	30	100	30	100	28	100	30	100	144	100

Based on result of the survey (Table 19), all respondents who are doing scavenging system (15 respondents, 100%) do the activity along all seasons, not depends on the weather. They herd ducks every day, mostly (66.7%) start to herd at 08.00 – 09.00 AM, after they collect eggs from ducks. They usually finish herding at 03.00 – 04.00 PM (80%). Interviewed farmers who are doing the scavenging system are moving in various distances following post harvest paddy-field areas and not depend on seasons. None of respondents moves only within the village. Because of always looking for new post harvest areas, scavenging system mostly follow with the movement in long distances. A large part of respondents (46.7%) do the movement across other district within one province.

There are respondents also move to other province (13.3%). Other parts of respondents move within one sub-district (6.7%) and the others move within one district (33.3%). More than a half of total respondents (60%) move from one area to other area for herding by vehicles or other transportation because of the distance is far enough. Before doing this long distance movement, one or two farmers firstly will survey the new area defined. If they have found a new-suitable area for herding, 1-4 farmers will join and rent a truck or other vehicles for transporting the ducks and all tools needed for herding to the new herding area.

Interviewed farmers who do the herding system and give an additional feed doing the herding system according to times. The highest percentage is farmers who choose time for herding following paddy-rice cycle but not at all seasons (69%, 89 out of 129 respondents). This system is very much depends on weather condition and presence of post harvest paddy-fields around where the farmer lives. If the weather is too hot or a rainy day, also when there is no post harvest area around due to the time for planting, then ducks will put in the colony confinements with or without a yard as a free range area and get the feeding fully from the farmer. Generally, they move not too far in distances, not across the district.

Interviewed farmers choose doing the herding system (besides giving an additional feed) at all seasons and following paddy-rice cycle is 26.4% ( 34 out of 129 respondents). Besides, other farmers choose herd ducks at all seasons without depending on paddy-rice cycle (3.1%, 4 out of 129 respondents). Both types of farmer mentioned above are almost similar. Based on respondent's answer, both types of farmers emphasize one thing that herding ducks do at all seasons, both in hot or rainy time. Commonly, farmers have decided how far they will move when herding ducks because they also have other resources of feed by giving an additional feed. The difference is dependency of the first type on the presence of post harvest area, while the second type still herding ducks although there is no more post harvest area around the range defined. Ducks is still herding to other location for getting natural feed such as along the river or late pond with uncertain of long and frequency of herding.

Other respondents (1.6%, 2 out of 129 respondents) who give an additional feed besides herding ducks said that activity of herding very depends on weather conditions. This group of farmers will choose to put ducks in the confinements and give feed daily when the weather condition is not good (rainy, too hot) although there are post harvest area around. Farmers usually will not move too far, only within the village.

In fact, there is no one absolute system and time of herding applied by one farmer who gives additional feed besides herding ducks. They mostly mixed the systems or try to compare vary of systems depend on condition of each farmer. While farmers do scavenging system mostly have one fixed system because they have decided only by herding ducks will get the feed. The reason is

that they want to cut feeding expenses and usually also supported by topography area that have wide of paddy fields area.

In general, there is no difference in the way to move on herding and in the way to get area of herding both in result of each district and result based on duck feed resources. In addition, distance of movement very important to decide whether the farmer need a transportation help or not. Comparison between herding system based on duck feed resources show on the Table 19 below.

**Tabel 19. Herding system done by respondents based on duck feed resources**

No	Classifications	Free range - scavenging system		Free range with additional feed		Total	
		N	%	N	%	N	%
1	Time of herding : ▪ All season, depend on paddy-rice cycle / harvest time ▪ All season, not depend on paddy-rice cycle ▪ Depend on paddy-rice cycle, not all season ▪ Depend on season / weather	15 - - -	100 - - -	34 4 89 2	26.4 3.1 69 1.6	49 4 89 2	34 2.8 61.8 1.4
	T o t a l	15	100	129	100	144	100
2	Frequency of herding : ▪ Everyday ▪ Once in 2 days ▪ Not certain time	15 - -	100 - -	118 2 9	91.5 1.6 7	133 2 9	92.4 1.4 6.3
	T o t a l	15	100	129	100	144	100
3	Start of herding : ▪ 06.00 am – 07.00 am ▪ 8.00 am – 09.00 am	5 10	33.4 66.7	84 45	65.1 34.9	89 55	59.4 36.7
	T o t a l	15	100	129	100	144	96
4	End of herding : ▪ 12.00 am ▪ 03.00 pm – 04.00 pm ▪ 05.00 pm – 06.00 pm	- 12 3	- 80 20	2 60 67	1.6 46.5 52.9	6 74 70	4 49.3 46.7
	T o t a l	16	100	129	100	144	96
5	Movement distance : ▪ Moving within 1 village ▪ Moving within 1 sub-district ▪ Moving within 1 district ▪ Moving within 1 province ▪ Moving accross the province	- 1 5 7 2	- 6.7 33.3 46.7 13.3	27 39 26 20 17	20.9 30.2 20.2 15.5 13.2	27 40 31 27 19	18.8 27.8 21.5 10.8 3.2
	T o t a l	15	100	129	100	144	100
6	The way to move : ▪ By vehicles / transportation tools ▪ By driving the duck ▪ Mixed	9 2 4	60 13.3 26.7	54 29 46	41.9 22.5 35.7	63 31 50	43.8 21.5 34.7
	T o t a l	15	100	129	100	144	100
7	How to get herding area : ▪ Rent ▪ Not rent	2 13	13.3 86.7	5 124	3.9 96.1	7 137	4.9 95.1
	T o t a l	15	100	129	100	144	100

Location of herding chosen by each of interviewed farmer are vary depends on condition of nature or topography area around farmers. Table 20

showed variation of herding locations and various natural feed can be found on the various of herding location. One interviewed farmer mentioned more than one of herding location or kind of natural feed that found, so the cumulative number of answer is not equal with cumulative number of respondents.

Beach or coastal area as one of herding locations is characteristic of area found on District of Cirebon. When the survey was held in Cirebon district, farmers mentioned that herding in beach is rarely done now. They prefer to put their ducks in confinements and give them fishes as an additional feed which are very easy to get in that area. The table also shows the fact that the presence of free-range ducks or scavenging ducks are contribute in destroying one of paddy-field pest which is the golden snail. The role of ducks is as a biological control. Others type of feed which can be found is various of insect and crustaceans.

**Tabel 20. Herding locations and various of feed found in herding areas**

No	Classifications	Pemalang ( N )	Brebes ( N )	Cirebon ( N )	Subang ( N )	Tangerang ( N )	T o t a l ( N )
1	Herding locations : ▪ Rice-field ▪ Beach / coastal area ▪ Along the river ▪ Late ponds ▪ Following the cannals / irrigation ditch	26 - 5 1 6	29 - 1 - 3	30 11 30 15 24	28 - 13 2 7	30 - 1 - 2	143 11 50 18 42
2	Vary of feed found on herding area ▪ Waste of harvest rice ▪ Unhulled rice ▪ Golden snail ▪ Black snail ▪ Little fishes ▪ Worm	23 26 11 4 7 21	24 25 3 5 19 27	30 28 2 3 26 27	15 18 10 3 26 12	20 29 27 - 28 25	111 126 137 53 80 112

### C. Additional Feed

Most of farmers (135 out of 150 total respondents) gave additional feed for their duck and start to do it in various ages. A large part of respondents (53.3%, 72 out of 135 respondents) said giving additional feed since less than 10 weeks age of duck. Forty six respondents from 135 respondents (43.1%) mentioned giving additional feed when ducks in 21-30 weeks of age, or when duck ready for laying eggs (get into production period).

While other respondents as the least percentages (12.6%) gave additional feed to ducks on 10-20 weeks of age. Differences on age of start for given additional feed actually depends on age of ducks when first bought or reared by farmers. Frequency of giving additional feed also vary depends on how long term the herding per day, presence of herding area, or weather



conditions. When weather look like not give any advantages or there is no post harvest area anymore, then farmers better increasing the frequency of giving additional feed ( 2-3 times per day ) and starts to put ducks in the confinements (Table 21).

**Tabel 21. Additional feed given by farmers in each district area**

No	Classifications	Pemalang		Brebes		Cirebon		Subang		Tangerang		T o t a l	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Age of start given :												
	▪ < 10 weeks	11	50	23	95.8	13	43.3	21	72.4	4	13.3	72	53.3
	▪ 10-20 weeks	-	-	-	-	10	33.3	5	17.2	2	6.7	17	12.6
	▪ 21-30 weeks	11	50	1	4.2	7	23.3	3	10.3	24	80	46	34.1
	T o t a l	22	100	24	100	30	100	29	100	30	100	135	100
2	Frequency of giving / day :												
	▪ Once	2	9.1	5	20.8	-	-	1	3.4	-	-	8	5.9
	▪ Twice	9	40.9	6	25	14	46.7	19	65.5	10	33.3	58	43
	▪ 3 times	11	50	13	54.2	16	53.3	9	31	20	66.7	69	51.1
	T o t a l	22	100	24	100	30	100	29	100	30	100	135	100

Present of additional feed based on duck feed resources show on Table 22. There is no significant differences between present of additional feed in each district and present of additional feed based on duck feed resources. More information collected said that usually on fully feeding system, farmers give feed twice or 3 times per day.

**Tabel 22. Additional feed given by farmers based on duck feed resources**

No	Classifications	Free range with additional feed		Fully feeding		T o t a l	
		N	%	N	%	N	%
1	Age of start given						
	▪ < 10 weeks	68	52.7	4	66.7	72	53.3
	▪ 10-20 weeks	15	11.6	2	33.3	17	12.6
	▪ 21-30 weeks	46	35.7	-	-	46	34.1
	T o t a l	129	100	6	100	135	100
2	Frequency of giving / day						
	▪ Once	7	5.4	-	-	7	5.2
	▪ Twice	57	44.2	2	33.3	59	43.7
	▪ 3 times	65	50.4	4	66.7	69	51.1
	T o t a l	129	100	6	100	135	100

Additional feed given by respondents to ducks in each district vary depends on local resources had been provide on each district. Area close to the beach will very easy to provide duck feed with high number of protein such as sea-fish with very cheap of price. While on lowland area that far enough from the beach mostly very easy to get additional feed such as restaurant waste or kitchen waste than outcast fish. Kind of additional feed usually used by respondents in each district show on Table 23.

**Tabel 23. Kind of additional feed usually used by respondents in each district area**

No	Kind of feed	Pemalang	Brebes	Cirebon	Subang	Tangerang	T o t a l
		( N )	( N )	( N )	( N )	( N )	( N )
1	Concentrate / factory feed	6	14	4	1	-	25
2	Outcast fish	17	17	20	2	23	79
3	Restaurant / kitchen waste	21	9	1	1	-	32
4	Waste of garden / planting	3	10	9	16	-	38
5	Hand made feed / mixed	-	-	12	1	-	13

Kind of feed given to ducks based on duck feed resources do not show any differences between group of farmers who give additional feed besides herding ducks and group of farmer fully feeding ducks everyday (Table 24). Factory feed is usually a concentrate with high contents of fiber that given as source of energy. Farmer mixed it with bran which is more cheaper in price for pressing an expenses. Natural resources from the sea as source of high protein is little fishes that used to be chopped or blended and given also at mid day (on feeding 3 times per day).

Respondents also use shell of crustaceans (shell-fish) as source of calcium. Shell of crustaceans mixed with concentrate and other kitchen waste such as dry-rice (*Loyang*) and given twice a day in the morning and or in the afternoon. At lowland area closed to arable land / unirrigated land or plantation area, various of other feed can be found such as chopped of corn bump or waste of flour-hulling.

**Tabel 24. Kind of additional feed usually used by respondents based on duck feed resources**

No	Kind of feed	Free range with additional feed	Fully feeding
		( N )	( N )
1	Concentrate / factory feed	22	3
2	Outcast fish	74	5
3	Restaurant / kitchen waste	27	5
4	Waste of garden / planting	36	2
5	Hand made feed / mixed	13	-

## D. Confinement System

All respondents (100%, 150 respondents) said that they built a confinement for their ducks. From a total number of respondents, 70% farmers built a non permanent confinement and 30% built a permanent confinement. Both permanent and non permanent confinement, the density number usually used by respondents is a 10 heads/m<sup>2</sup> (67.3%, 101 out of 150 respondents ). Other respondents used the density number less than 10 heads/m<sup>2</sup>. Eight farmers (5.3%) put ducks in the confinements with 21-30 heads/m<sup>2</sup> for density number, only 2 respondents use the density number more than 30 heads/m<sup>2</sup> (Table 25).

**Table 25. Confinement system built by respondents in each district area**

No	Classifications	Pemalang		Brebes		Cirebon		Subang		Tangerang		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Type of confinement :												
	▪ Permanent	17	56.7	9	30	14	46.7	3	10	2	6.7	45	30
	▪ Non permanent	13	43.3	21	70	16	53.3	27	90	28	93.3	105	70
	Total	30	100	30	100	30	100	30	100	30	100	150	100
2	Kind of permanent confinement :												
	▪ Only the roof without the wall, with a yard, pond / water area , fence	-	-	4	44.4	9	64.3	-	-	-	-	13	28.9
	▪ Colony confinement with a yard, water area and fence	12	70.6	2	22.2	5	35.7	2	66.7	1	50	22	48.9
	▪ Colony confinement	5	29.4	3	33.3	-	-	1	33.3	1	50	10	22.2
	Total	17	100	9	100	14	100	3	100	2	100	45	100
3	Treatment for waste of non permanent confinement :												
	▪ Throw it away	-	-	-	-	2	12.5	1	3.7	9	32.1	12	11.4
	▪ Reuse for new confinement	13	100	21	21	14	87.5	26	96.3	19	67.9	93	88.6
	Total	13	100	21	100	16	100	27	100	28	100	105	100
4	Density number of confinement :												
	▪ < 10 / m <sup>2</sup>	23	76.7	17	56.7	22	73.3	9	30	30	100	101	67.3
	▪ 10-20 / m <sup>2</sup>	6	20	9	30	7	23.3	16	53.3	-	-	38	25.3
	▪ 21-30 m <sup>2</sup>	1	3.3	4	13.3	1	3.3	2	6.7	-	-	8	5.3
	▪ > 30 / m <sup>2</sup>	-	-	-	-	-	-	3	10	-	-	3	2
	Total	30	100	30	100	30	100	30	100	30	100	150	100

Confinement system done by respondents are show clearly on Table 26. From 15 respondents who do scavenging, all of them (100%) built a non permanent confinement. From 129 respondents who give an additional feed besides herding ducks, 69.8% farmer built a non permanent confinement (90 out of 129 respondents), and 39 other respondents (30.2%) built a permanent confinement. While total respondents who do fully feeding system without herding ducks (100%, 6 respondents) built a permanent confinement.

**Tabel 26. Confinement system built by respondents based on duck feed resources**

No	Classifications	Free range – scavenging system		Free range with additional feed		Fully feeding		T o t a l	
		N	%	N	%	N	%	N	%
1	Type of confinement :								
	▪ Permanent	-	-	39	30.2	6	100	45	30
	▪ Non permanent	15	100	90	69.8	-	-	105	70
	T o t a l	15	100	129	100	6	100	150	10
2	Kind of permanent confinement :								
	▪ Only the roof without the wall, with a yard, pond / water area , fence	-	-	13	33.3	-	-	13	28.9
	▪ Colony confinement with a yard, water area and fence	-	-	19	48.7	3	50	22	48.9
	▪ Colony confinement	-	-	7	17.9	3	50	10	22.2
	T o t a l	-	-	39	100	6	100	45	100
3	Treatment for waste of non permanent confinement :								
	▪ Throw it away	-	-	12	13.3	-	-	12	11.4
	▪ Reuse for new confinement	15	100	78	86.7	-	-	93	88.6
	T o t a l	15	100	90	100	-	-	105	100
4	Density number of confinement :								
	▪ < 10 / m <sup>2</sup>	4	26.7	92	71.3	5	83.3	101	67.3
	▪ 10-20 / m <sup>2</sup>	9	60	28	21.7	1	16.7	38	25.3
	▪ 21-30 m <sup>2</sup>	2	13.3	6	4.7	-	-	8	5.3
	▪ > 30 / m <sup>2</sup>	-	-	3	2.3	-	-	3	2
	T o t a l	15	100	129	100	6	100	150	100

A non permanent confinement usually made from local material such as bamboo for the skeleton or the frame, with wall or roof made from tarpaulin or plastic bag. Several farmers only use plastic net with many holes as a wall of confinement. A non permanent confinement usually is a colony confinement with land as the floor covered by chaff or dried rice stalks without fence neither a yard or pond. Commonly, a non permanent confinement built by farmer doing scavenging or farmer giving additional feed besides herding the ducks.

In scavenging system, a non permanent confinement built along the herding area. Confinements built around post harvest area where ducks is herding. One confinement belongs to one farmer can built close to other confinement belongs to other farmer. Almost always confinements built as a long confinements and separated by bamboo and plastic bag for marking each ownership of farmer. They also built a shelter or non permanent place for stay overnight around their ducks. Farmer will bring their confinements and other tools needed for herding activity to the next new herding area.

All of farmer do scavenging system (100%) said they will reuse the confinements as a new confinements on the new herding area. Majority of respondents who do herding ducks and give additional feed which built a non permanent confinement (86.7%, 78 out of 90 respondents) mentioned they also will use the old confinement for build the same type of confinement on new area.

Only 12 out of 90 respondents (13.3%) answered they throw the old confinement and not use it again.

Permanent confinement or semi-permanent confinement usually made by farmer who do fully feeding and some of farmer who do herding system besides giving additional feed to ducks. Construction of permanent confinement vary depend on area readiness and economic capability of each farmer. Confinement in common construction made from bamboo for the skeleton with isthmus as a roof. The confinement do not use a wall, only fence about one meter of height for separating one group of ducks to the other group.

Farmer usually provide an open area or a yard as free range area for duck to play. It is also completed with little pond, ditch or water in pail for ducks drinking and to comply with duck's instinct that really love water. Farmers with not enough wide of area for confinement only built a colony confinement which is similar with a non permanent confinement, made from bamboo as skeleton and tarpaulin or plastic bag as a wall and roof.

Based on result of this questionnaire survey, farmers who do fully feeding and farmers who do herding system besides give additional feed usually use density number of confinement less than 10 heads of duck per square meter. While farmers who do scavenging put ducks in colony confinements with density number around 10-20 heads of ducks per square meter.

## **E. Labour Input**

Majority of interviewed farmers are taking care of their ducks by themselves. Besides as an owner, respondents also act as a worker (56.7%, 85 out of 150 respondents). Forty nine out of total respondents (32.7%) ask some help from their family including wife and children to run the duck farm. Neighbors (8.0%) and person outside the village (2.7%) also being asked by respondents to become their workers in herding ducks, cleaning the confinement or for preparing for feed. Mostly number of workers in duck farms belongs to respondents is 1-3 person (98.0%), including the respondent. Some workers stay overnight around the herding area, others live at their own home.

Neighbor and person outside the village are group of person outside the family, then respondents must pay them well. In general, only 13.3% respondents pay their workers, while majority of respondents (86.7%) do not pay their workers because of majority of workers are themselves. Similar with other traditional bussines system, family and him/herself is never included as worker who deserve to get salary. How much salary given to workers are vary depends on the duty. Based on answer of several respondents, workers who responsible for whole farm included herding, cleaning confinement and feed preparation will get salary around Rp. 500.000,- per month. Workers with duty on preparation

feed only such as chopping fishes or corn bump get daily fee around Rp. 4.000,- per day (Table 27).

**Table 27. Labour input system run by respondents in each district area**

No	Classifications	Pemalang		Brebres		Cirebon		Subang		Tangerang		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Workers												
	▪ Respondent / themself	21	70	22	73.3	11	36.7	14	46.7	17	56.7	85	56.7
	▪ Family	4	13.3	4	13.3	12	40	16	53.3	13	43.3	49	32.7
	▪ Neighbor	5	16.7	-	-	7	23.3	-	-	-	-	12	8
	▪ Person outside the village	-	-	4	13.3	-	-	-	-	-	-	4	2.7
	Total	30	100	30	100	30	100	30	100	30	100	150	100
2	Number of workers :												
	▪ 1-3 person	29	96.7	30	100	30	100	30	100	28	93.3	147	98
	▪ 4-10 person	1	3.3	-	-	-	-	-	-	1	3.3	2	1.3
	▪ > 10 person	-	-	-	-	-	-	-	-	1	3.3	1	0.7
	Total	30	100	30	100	30	100	30	100	30	100	150	100
3	Give salary to worker :												
	▪ Yes	5	16.7	5	16.7	9	30	1	3.3	-	-	20	13.3
	▪ No	25	83.3	25	83.3	21	70	29	96.7	30	100	130	86.7
	Total	30	100	30	100	30	100	30	100	30	100	150	100

There is no differences shown between labour system of duck farming run by respondents based on duck feed resources and within each district. Majority of workers are respondents and the family, with average number is 1-3 person. And there is no rule for giving salary to themselves or family as a worker (Table 28).

**Tabel 28. Labour input system run by respondents based on duck feed resources**

No	Classifications	Free range - scavenging system		Free range with additional feed		Fully feeding		Total	
		N	%	N	%	N	%	N	%
1	Workers								
	▪ Respondent / themself	13	86.7	71	55	1	16.7	85	56.7
	▪ Family	2	13.3	43	33.3	4	66.7	49	32.7
	▪ Neighbor	-	-	11	8.5	1	16.7	12	8.0
	▪ Person outside the village	-	-	4	3.1	-	-	4	2.7
	Total	15	100	129	100	6	100	150	100
2	Number of workers :								
	▪ 1-3 person	15	100	126	97.7	6	100	147	98
	▪ 4-10 person	-	-	2	1.6	-	-	2	1.3
	▪ > 10 person	-	-	1	0.8	-	-	1	0.7
	Total	15	100	129	100	6	100	150	100
3	Give salary to worker :								
	▪ Yes	-	-	19	14.7	1	16.7	20	13.3
	▪ No	15	100	110	85.3	5	83.3	130	86.7
	Total	15	100	129	100	6	100	150	100

### 3. Production System

All interviewed farmers (150 respondents, 100%) mentioned that eggs is their main purpose of duck farming. Duck becomes the output when they have no production anymore and the duck were sold out as a culling duck. Several farmers also hatched the eggs to be used by their own breeder and not for sale. Duck for eggs purpose usually get into productive period at 24 weeks of age and culling off at 2 years or more years of age. A few respondents mentioned they sold out all ducks in the productive period because of urgent needs and for getting a higher price.

Egg productions of 50-75% per month placed as the top percentage of all respondents (46%, 69 out of 150 respondents), 47 respondents (31.3%) said the egg production of their ducks more than 75% per month, and 34 respondents (22.7%) have less than 50% per month. Duck usually lay eggs inside the confinement (92.7%, 139 out of 150 respondents), sometimes also found on the yard of confinement (3.3%), and on the herding area (4.0%). Eggs being collected by farmers in the morning before they let the ducks to be freed in the yard or herding area.

Manure as by-product were thrown away to surround the confinement or yard by majority of the respondents (40.7%, 61 out of 150 respondents). Some of the respondents (24.7%) use manure as fertilizer for their own planting farm or garden, other respondents sell the manure to other people (16.7%). There are also several farmers who give the manure free of charge to other people (11.3%), while other farmers do not care about manure of their ducks and do nothing to the manure (6.7%). Feathers as other by-product of ducks are not commonly use by respondents because feathers usually sell out following duck become culling animals. Production system of duck farm running by respondents in each district shown in Table 29.

**Tabel 29. Production system of duck farm run by respondents in each district area**

No	Classifications	Pemalang		Brebés		Cirebon		Subang		Tangerang		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Purpose of farm :												
	▪ Egg	30	100	30	100	30	100	30	100	30	100	30	100
	Total	30	100	30	100	30	100	30	100	30	100	150	100
2	Egg production / month :												
	▪ < 50 %	9	30	11	36.7	8	26.7	4	13.3	2	6.7	34	22.7
	▪ 50-75 %	18	60	13	43.3	10	33.3	15	50	13	43.3	69	46
	▪ > 75 %	3	10	6	20	12	40	11	36.7	15	50	47	31.1
	Total	30	100	30	100	30	100	30	100	30	100	150	100
3	Place for lay egg :												
	▪ Inside the confinement	27	90	23	76.7	30	100	29	96.7	30	100	139	92.7
	▪ On the yard	2	6.7	3	10	-	-	-	-	-	-	5	3.3
	▪ On herding area	1	3.3	4	13.3	-	-	1	3.3	-	-	6	4.0
	Total	30	100	30	100	30	100	30	100	30	100	150	100
4	Manure as by-product :												
	▪ Throw it away	9	30	13	43.3	14	46.7	15	50	10	33.3	61	40.7
	▪ Use by respondents for planting area as fertilizer	6	20	6	20	9	30	5	16.7	11	36.7	37	24.7
	▪ Sell out as fertilizer	9	30	6	20	7	23.3	1	3.3	2	6.7	25	16.7
	▪ Give it free to other people	6	20	1	3.3	-	-	3	10	7	23.3	17	11.3
	▪ No treatment	-	-	4	13.3	-	-	6	20	-	-	10	6.7
	Total	30	100	30	100	30	100	30	100	30	100	150	100

Based on duck feed resources, no differences found between 3 groups of farmers in main purpose of running duck farm. All respondents (100 %) choose egg as main purpose of their duck farm. Six out of 15 interviewed farmers who do scavenging system (40%) mention they have low egg production number at that time, less than 50% per month. Four farmers (26.7%, 4 out of 15 respondents) have 50-75% per month of egg production number, while others 5 respondents (33.3%) mention the egg production number more than 75% per month.

On group of farmers who do the herding system and give additional feed, highest percentages of respondents (48.1%, 62 out of 129 respondents) mention the egg production number is 50-75% per month. Forty two respondents (32.6%) have ducks with egg production number more than 75%, and the least number of respondents (19.4%, 25 respondents) said their duck only give an egg less than 50% per month. On group of farmers who do fully feeding system, show the balance percentages of respondents between mention have egg production number less than 50% (3 out of 6 respondents, 50%) and have 50-75% of egg production number (3 out of 6 respondents, 50%).

Based on result mentioned above, in cumulative number, egg production number 50% to more than 75% mostly found on group of farmers who do the herding system beside give additional feed than on two other groups. However, it is not an absolute result as representation of all aspects. One reason for example is because age of duck different on each farmers. Therefore, need a more specific investigation or study for compare duck egg production level based on duck feed resources.



Manure as one of by-product of duck usually given free to other people by farmers who are doing the scavenging system (33.3%) and mostly give to the owner of post harvest area where they herd ducks. Majority respondents from group of farmers who do herding system and give additional feed throw away the manure or use it for their own needed. While farmers who do fully feeding system usually prefer to sell out the manure (66.7%) (Table 30).

**Table 30. Production system of duck farm run by respondents based on duck feed resources**

No	Classifications	Free range - scavenging system		Free range with additional feed		Fully feeding		Total	
		N	%	N	%	N	%	N	%
1	Purpose of farm :								
	▪ Egg	15	100	129	100	6	100	150	100
	Total	15	100	129	100	6	100	150	100
2	Egg production / month :								
	▪ < 50 %	6	40	25	19.4	3	50	34	22.7
	▪ 50-75 %	4	26.7	62	48.1	3	50	69	46
	▪ > 75 %	5	33.3	42	32.6	-	-	47	31.3
	Total	15	100	129	100	6	100	150	100
3	Place for lay egg :								
	▪ Inside the confinement	12	80	121	93.8	6	100	139	92.7
	▪ On the yard	2	13.3	3	2.3	-	-	5	3.3
	▪ On herding area	1	6.7	5	3.9	-	-	6	4.0
	Total	15	100	129	100	6	100	150	100
4	Manure as by-product :								
	▪ Throw it away	4	26.7	56	43.4	1	16.7	61	40.7
	▪ Use by respondents for planting area as fertilizer	4	26.7	32	24.8	1	16.7	37	24.7
	▪ Sell out as fertilizer	-	-	21	16.3	4	66.7	25	16.7
	▪ Give it free to other people	5	33.3	12	9.3	-	-	17	11.3
	▪ No treatment	2	13.3	8	6.2	-	-	10	6.7
	Total	15	100	129	100	6	100	150	100

#### 4. Animal Health System

In general, animal health programme done by respondents in each district shown in Table 31. Majority of respondents (74.7%, 112 out of 150 respondents) do not give a vaccination to their fowls, only 38 farmers (25.3%) do vaccination. This percentage is nearly similar in each district where number of respondents who are not doing vaccination is higher than the do not. Result also found that anthelmintic drug given, only 24 out of 150 respondents (16.0%) care about the danger of worms and 84.0% of respondents answered they never give an anthelmintic drug. Brand name of vaccines given by respondents such as AI vaccine, Medivac AI and Medivac ND. Common brand names of anthelmintic use by farmers for an example are Combantrin®, Nemasol®, Upixon®, Jamu Jago® and Kamsekcou®.

Antibiotics is commonly utilized by all respondents and shown almost similar percentage. Eighty five out of 150 respondents (56.7%) mentioned they do not use antibiotics for their fowls, while 43.% of total respondents give antibiotics as medicine for their sick fowls. Information about the usage of some antibiotics is very easy spread among farmers, although sometimes they do not know exactly what is the advantages of antibiotics. Antibiotic brand names usually use by respondents are Antisnot<sup>®</sup>, Tetrachlor<sup>®</sup>, Colibac<sup>®</sup>, Enromas<sup>®</sup>, Supralit<sup>®</sup>, Taclor<sup>®</sup>, Trimezyne<sup>®</sup>, Sulfadiazine<sup>®</sup> and Chlorifit<sup>®</sup>.

The majority of respondents were very familiar with using of vitamins, 72.7% respondents said they give vitamins to their ducks. The advantages of using vitamins is very easy to see between farmers, mostly farmers said they are happy the ducks looks great and health after giving vitamins. An example of vitamin brand names usually use by farmers are B-Complex<sup>®</sup>, B12<sup>®</sup>, Anaegg<sup>®</sup>, Anavit<sup>®</sup>, Ciami<sup>®</sup>, Anapest<sup>®</sup>, Egg Stimulant<sup>®</sup>, Vitachick<sup>®</sup>, Vitastress<sup>®</sup>, Turbo<sup>®</sup>, dan Vitabro<sup>®</sup>.

Information about animal health programme on fowls and using of medicine (commercial medicine) got by farmers by several ways. A big part of respondents (49.3%, 74 out of 150 respondents) got the information from other farmers and 44.0% farmers got the informations from district livestock services officer in their area. Only 4 respondents (2.7%) get the information from veterinarians at animal health posts, while other farmers (6 respondents, 4%) admitted never know about the animal health programme for their ducks. Farmers who know the information get it from district animal health officer or from poultry shops.

After receiving animal health information, most of farmers wanted to give a medicine for their sick ducks by themselves (58.7%). Some of farmers report to the district animal health officer to get some helps on medicating their sick ducks (34.7%). If the medications works well, the informations about that will spread easily between farmers then they will try to medicate their ducks by their own hands.

**Tabel 31. Animal health programme for ducks by respondents in each district area**

No	Classifications	Pemalang		Brebes		Cirebon		Subang		Tangerang		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Vaccination :												
	▪ Yes	1	3.3	5	16.7	12	40	10	33.3	10	33.3	38	25.3
	▪ No	29	96.7	25	83.3	18	60	20	66.7	20	66.7	112	74.7
	Total	30	100	30	100	30	100	30	100	30	100	150	100
2	Anthelmenthicum :												
	▪ Yes	-	-	2	6.7	7	23.3	15	50	-	-	24	16
	▪ No	30	100	28	93.3	23	76.7	15	50	30	100	126	84
	Total	30	100	30	100	30	100	30	100	30	100	150	100
3	Antibiotics :												
	▪ Yes	22	73.3	14	16	11	36.7	10	33.3	8	26.7	65	43.3
	▪ No	8	26.7	46.7	53.3	19	63.3	20	66.7	22	73.3	85	56.7
	Total	30	100	30	100	30	100	30	100	30	100	150	100
4	Vitamins :												
	▪ Yes	24	80	24	80	27	90	18	60	16	53.3	109	72.7
	▪ No	6	20	6	20	3	10	12	40	14	46.7	41	27.3
	Total	30	100	30	100	30	100	30	100	30	100	150	100
5	Origin of animal health programme :												
	▪ Veterinarian of animal health post	-	-	-	-	3	10	-	-	1	3.3	4	2.7
	▪ Animal health district officer	16	53.3	6	20	15	50	6	20	23	76.7	66	44
	▪ Other farmers	3	43.3	22	73.3	11	36.7	22	73.3	6	20	74	49.3
	▪ Never know about the information	1	3.3	2	6.7	1	3.3	2	6.7	-	-	6	4
	Total	30	100	30	100	30	100	30	100	30	100	150	100
6	Who do the animal health programme :												
	▪ Veterinarian of animal health post	-	-	-	-	4	13.3	-	-	1	3.3	5	3.3
	▪ Animal health district officer	10	33.3	2	6.7	13	43.3	2	6.7	25	83.3	52	34.7
	▪ Done by farmers	19	63.3	25	83.3	12	40	28	93.3	4	13.3	88	58.7
	▪ None	1	3.3	3	10	1	3.3	-	-	-	-	5	3.3
	Total	30	100	30	100	30	100	30	100	30	100	150	100

General illustration of animal health programme done by respondents based on duck feed resources grouping show on Table 32. No differences found if it compares to the programme done by respondents in each district. Result of questionnaire said that most of farmers do the scavenging system (93.3%) get the information about animal health programme from other farmers and they do the medications by themselves. This could be happened because in scavenging system farmers very often moving from one area to other area so that they have less contact with district animal health officers.

It was a different conditions with farmers who do fully feeding and farmers who give additional feed besides herding the ducks. In the last two groups mentioned, farmers usually join into a group of farmers. Animal health district officer more easily comes to a group of farmers for giving an information or helping on medications than to individual farmers or farmers who always moving from one area to other area.

**Table 32. Animal health programme for ducks by respondents based on duck feed resources**

No	Classifications	Free arange - scavenging system		Free range with additional feed		Fully feeding		Total	
		N	%	N	%	N	%	N	%
1	Vaccination :								
	▪ Yes	2	13.3	36	27.9	-	-	38	25.3
	▪ No	13	86.7	93	72.1	6	100	112	74.7
	Total	15	100	129	100	6	100	150	100
2	Anthelmenthicum :								
	▪ Yes	-	-	24	18.6	-	-	24	16
	▪ No	15	100	105	81.4	6	100	126	84
	Total	15	100	129	100	6	100	150	100
3	Antibiotics :								
	▪ Yes	8	53.3	55	42.6	2	33.3	65	43.3
	▪ No	7	46.7	74	57.4	4	66.7	85	56.7
	Total	15	100	129	100	6	100	150	100
4	Vitamins :								
	▪ Yes	13	86.7	91	70.5	5	83.3	109	72.7
	▪ No	2	13.3	38	29.5	1	16.7	41	27.3
	Total	15	100	129	100	6	100	150	100
5	Origin of animal health programme :								
	▪ Veterinarian of animal health post	-	-	4	3.1	-	-	4	2.7
	▪ Animal health district officer	-	-	64	49.6	2	33.3	66	44
	▪ Other farmers	14	93.3	57	44.2	3	50	74	49.3
	▪ Never know about the information	1	6.7	4	3.1	1	16.7	6	4
	Total	15	100	129	100	6	100	150	100
6	Who do the animal health programme :								
	▪ Veterinarian of animal health post	-	-	5	3.9	-	-	5	3.3
	▪ Animal health district officer	-	-	52	40.3	-	-	52	34.7
	▪ Done by farmers	14	93.3	69	53.5	5	83.3	88	58.7
	▪ None	1	6.7	3	2.3	1	16.7	5	3.3
	Total	15	100	129	100	6	100	150	100

A symptom of disease very often found by respondents is paralyze (61.3%, 92 out of 150 respondents). This symptom is placed as the highest percentage found compare to other symptoms such as diarrhea, cough / sneezing and weak condition or do not want to eat feed/no appetite. Farmers also very often found others clinical signs of disease such as sleepy, turned or twisted neck, have a white droppings and have an exudates come out from the ear. Sick ducks mostly treated with medications by farmers themselves (53.3%). This condition is found in all districts except in Tangerang district.

Farmers in Tangerang district prefer to slaughter their sick duck (60%). It might be because they have a good understanding on transmission of diseases, or they do not want to loose an economic value so that they sell a slaughtered animals for consumption. Other parts of total respondents choose to sell the sick fowls, separate into special confinements, and several farmers do nothing and just let it be.

Beside using pharmaceutical products, part of interviewed farmers (64.7%, 97 out of 150 respondents) also use a traditional medicines made by

themselves. The purpose of traditional medicines given by respondents mostly for increasing the duck body defence, such as papaya leaf, *pace* leaf, *lamtoro* leaf, *kiomang* leaf, *kiareng* leaf, *peciplukan* leaf, tamarine-brown sugar, salt, milk-soda, sugar-water coconut, ginger, *kencur* (*Kaempferia galanga*) and *temulawak* (*Curcuma xanthorrhiza*). Table 33 shows the symptom of diseases often found and the treatment done by respondents in each district.

**Table 33. Symptom of diseases often found and the treatment done by respondents in each district area**

No	Classifications	Pemalang		Brebes		Cirebon		Subang		Tangerang		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Treatment for sick duck :												
	▪ Sell it out	13	43.3	2	6.7	2	6.7	2	6.7	2	6.7	21	14
	▪ Slaughtered	1	3.3	2	6.7	-	-	1	3.3	18	60	22	14.7
	▪ Give some medications	14	46.7	14	46.7	22	73.3	21	70	9	9	80	53.3
	▪ Do nothing	2	6.7	10	14	4	13.3	6	20	1	3.3	23	15.3
	▪ Others	-	-	2	10	2	6.7	-	-	-	-	4	2.7
	Total	30	100	30	100	30	100	30	100	30	100	150	100
2	Symptom of diseases often found :												
	▪ Diarrhea	-	-	5	16.7	11	36.7	-	-	1	3.3	17	11.3
	▪ Cough/sneezing	7	23.3	2	6.7	2	6.7	10	33.3	4	13.3	25	16.7
	▪ Do not want to eat	2	6.7	1	3.3	-	-	3	10	2	6.7	8	5.3
	▪ Paralyze	17	56.7	19	63.3	17	56.7	16	53.3	23	76.7	92	61.3
	▪ Others	4	13.3	3	10	-	-	1	3.3	-	-	8	5.3
	Total	30	100	30	100	30	100	30	100	30	100	150	100
3	Using of traditional remedies :												
	▪ Yes	14	46.7	15	50	26	86.7	23	76.7	19	63.3	97	64.7
	▪ No	16	53.3	15	50	4	13.3	7	7	11	36.7	53	35.3
	Total	30	100	30	100	30	100	30	100	30	100	150	100

Based on result of the study, there is no differences found on diseases commonly found and the treatment done both in each district area and based on grouping farmers by duck feed resources. High percentgaes of diseases found in each groups of farmers also a paralyze. The paralyze case actually is continuation of foot duck lameness. This case happened because of get stabbed by dried rice stalks or husk as a confinement litter. Other causes is injured or get stabbed by fish bone or by pieces of cockle shells as part of additional feed (Table 34).

**Table 34. Symptom od diseases often found and the treatment done by respondents based on duck feed resources**

No	Classifications	Free range – scavenging system		Free range with additional feed		Fully feeding		T o t a l	
		N	%	N	%	N	%	N	%
1	Treatment for sick duck :								
	▪ Sell it out	3	20	18	14	-	-	21	14
	▪ Slaughtered	-	-	22	17.1	-	-	22	14.7
	▪ Give some medications	9	60	66	51.2	5	83.3	80	53.3
	▪ Do nothing	3	20	19	14.7	1	16.7	23	15.3
	▪ Others	-	-	4	3.1	-	-	4	2.7
	T o t a l	15	100	129	100	6	100	150	10
2	Symptom of diseases often found :								
	▪ Diarrhea	3	20	14	10.9	-	-	17	11.3
	▪ Cough/sneezing	3	20	22	17.2	-	-	25	16.7
	▪ Do not want to eat	2	13.3	6	4.7	-	-	8	5.3
	▪ Paralyze	6	40	82	64.1	4	66.7	92	61.3
	▪ Others	1	6.7	5	3.9	2	33.3	8	5.3
	T o t a l	15	100	129	100	6	100	150	100
3	Using of traditional remedies								
	▪ Yes	7	46.7	86	66.7	4	66.7	97	64.7
	▪ No	8	53.3	43	33.3	2	33.3	53	35.3
	T o t a l	15	100	129	100	6	100	150	100

Based on the respondents information, mostly of them do not clearly enough about the causa of the clinical signs they have found. Table 35 show the relation between several clinical signs found by respondents to common diseases, but it can not explain the actual diseases in their poultry. Further information are needed both from respondents and animal health district services in that area and also supported by laboratory test to identify the disease.

**Table 35. Symptom of diseases often found by respondents and its relation with common diseases in duck**

Symptom of diseases often found by respondents	Common Disease Related with the Signs	Notes
Diarrhea	Duck Cholera	Infectious Disease
	Coccidiosis	Infectious Disease
	Salmonellosis	Infectious Disease
	Too much salt in the feed	Non-Infectious Disease
	Colibacillosis	Infectious Disease
	Spirochaetosis / Duck Tick Fever	Infectious Disease
Cough/Sneezing	Chronic Respiratory Disease	Infectious Disease
	Infectious Sinusitis	Infectious Disease
Do not want to eat/no appetite	-	Common signs for all disease (Infectious and Non-Infectious Disease)
Paralyze	Botulism / Limberneck	Infectious Disease
	Spirochaetosis / Duck Tick Fever	Infectious Disease
Sleepy	Lack of Vitamin A	Non-Infectious Disease
Turned or twisted neck	New castle Disease	Infectious Disease
White droppings	Pullorum	Infectious Disease
Exudates from eyes, nostril or the ear	Chronic Respiratory Disease	Infectious Disease
	Salmonellosis	Infectious Disease
	Lack of Vitamine A	Non-Infectious Disease

Source : Samosir, DJ (1983); FAO technical guide book (2004)

Result of questionnaire filled from all respondents show that highest percentages of duck mortality number per month is 1% (58%, 87 out of 150 respondents). The highest percentages of respondents in Pemalang, Brebes and Subang district is also show on mortality number 1%. In Cirebon district, 1% and 2.5% duck mortality number show the similar percentages of respondents choose, while highest mortality number in Tangerang district is 2.5% per month (50%, 15 out of 30 respondents).

The main cause of duck mortality mostly found by respondents is paralyze (60%, 90 out of 150 respondents). This paralyze is came from untreated duck lameness. Duck condition becomes worst after get stabbed by dried rice stalks or husk as a confinement litter because of nothing treatment get from the farmers and lead to the ducks death. Other causes means by respondents are duck death because of unpurpose eating cadaver which is have spoiled and a maggot. Duck also can die because of high stress on transportation when do the movement, unpurpose eating for insecticide on herding area, or die because of to be in a fix by other ducks during transportation.

Majority action taken by farmers for death ducks is throwing away to the rivers (59.3%, 89 out of 150 respondents). Some farmers throw the death duck to unuse paddy field area. A part of respondents ( 36%, 54 respondents ) burried in the death ducks. Usually they burried it at an unuse paddy field area, around the confinement, or unuse pond and dried rivers. Only 4% of total respondents burned the death ducks, while 1 respondents ( 0.7% ) mention to process the death ducks for fish feeding.

Majority action taken by respondents when they got a huge number of ducks mortality number is handled by them self (53.3%, 83 out of 150 respondents). Other high percentages is 26.7% (40 out of 150 respondents) for respondents answer that reporting the case to animal health district officer. Twenty seven respondents (18%) answer others for the huge mortality number that means they never been get the experiences (Table 36).

**Table 36. Illustration of ducks mortality belongs to respondents in each district area**

No	Classifications	Pemalang		Brebes		Cirebon		Subang		Tangerang		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Treatment for dead duck :												
	▪ Burned	-	-	-	-	-	-	3	10	3	10	6	4
	▪ Buried in	5	16.7	19	63.3	14	46.7	2	6.7	14	46.7	54	36
	▪ Throw it away	25	83.3	11	36.7	16	53.3	24	80	13	43.3	89	59.3
	▪ Processed for fish-feed	-	-	-	-	-	-	1	3.3	-	-	1	0.7
	Total	30	100	30	100	30	100	30	100	30	100	150	100
2	Mortality percentages / month :												
	▪ < 1 %	1	3.3	2	6.7	1	3.3	8	26.7	1	3.3	13	8.7
	▪ 1 %	26	86.3	23	76.7	10	33.3	14	46.7	14	46.7	87	58
	▪ 2-5 %	2	6.7	4	13.3	10	33.3	4	13.3	15	50	35	23.3
	▪ 6-10 %	-	-	-	-	7	23.3	2	6.7	-	-	9	6
	▪ 11-20 %	-	-	-	-	2	6.7	1	3.3	-	-	3	2
	▪ > 25 %	1	3.3	1	3.3	-	-	1	3.3	-	-	3	2
	Total	30	100	30	100	30	100	30	100	30	100	150	100
3	Main cause of death :												
	▪ Diarhea	2	6.7	5	16.7	10	33.3	-	-	-	-	17	11.3
	▪ Do not want to eat	4	13.3	3	10	2	6.7	-	-	1	3.3	10	6.7
	▪ Cough/sneezing	5	16.7	-	-	2	6.7	7	23.3	3	10	17	11.3
	▪ Paralyze	12	40	19	63.3	15	50	18	60	26	86.7	90	60
	▪ Others	7	23.3	3	10	1	3.3	5	16.7	-	-	16	10.7
	Total	30	100	30	100	30	100	30	100	30	100	150	100
4	If found a huge of mortality :												
	▪ Report to animal health district officer	2	6.7	4	13.3	13	43.3	4	13.3	17	56.7	40	26.7
	▪ Handle by myself	24	80	21	70	12	40	15	50	11	36.7	83	55.3
	▪ Others	4	13.3	5	16.7	5	16.7	11	36.7	2	6.7	27	18
	Total	30	100	30	100	30	100	30	100	30	100	150	100

Illustration of ducks mortality belongs to respondents based on duck feed resources show on Table 37. There is no differences show on duck mortality number between result of study in each district area and result of study based on duck feed resources. Interviewed farmers who do scavenging mention the duck mortality number vary around less than 1% to 1% per month, while the mortality number apparently higher on farmers who give additional feed besides herding ducks although still in the range less than 1% to 5% per month. Main causa of duck mortality show highest percentages on paralyze cases on three group of farmers based on duck feed resources. When the farmers get a huge of duck mortality number, they usually handle by themselves and not reporting to the animal health district officer for further investigations.



**Table 37. Illustration of ducks mortality belongs to respondents based on duck feed resources**

No	Classifications	Free range - scavenging system		Free range with additional feed		Fully feeding		Total	
		N	%	N	%	N	%	N	%
1	Treatment for death duck :	-	-	6	4.7	-	-	6	4
	▪ Burned	8	53.3	45	34.9	1	16.7	54	36
	▪ Burried in	7	46.7	77	59.7	5	83.3	89	59.3
	▪ Throw it away	-	-	1	0.8	-	-	1	0.7
	▪ Precessed for fish-feed	-	-	-	-	-	-	-	-
	Total	15	100	129	100	6	100	150	100
2	Mortality percentages / month :	-	-	-	-	-	-	-	-
	▪ < 1 %	1	6.7	10	7.8	2	33.3	13	8.7
	▪ 1 %	14	93.3	72	55.8	1	16.7	87	58
	▪ 2-5 %	-	-	33	25.6	2	33.3	35	23.3
	▪ 6-10 %	-	-	9	7	-	-	9	6
	▪ 11-20 %	-	-	3	2.3	-	-	3	2
	▪ > 25 %	-	-	2	1.6	1	16.7	3	2
	Total	15	100	129	100	6	100	150	100
3	Main cause of death :	-	-	-	-	-	-	-	-
	▪ Diarhea	1	6.7	16	12.4	-	-	17	11.3
	▪ Do not want to eat	4	26.7	6	4.7	-	-	10	6.7
	▪ Cough/sneezing	1	6.7	16	12.4	-	-	17	11.3
	▪ Paralyze	6	40	79	61.2	5	83.3	90	60
	▪ Others	3	20	12	9.3	1	16.7	16	10.7
	Total	15	100	129	100	6	100	150	100
4	If found a huge of mortality :	-	-	-	-	-	-	-	-
	▪ Report to animal health district officer	-	-	39	30.2	1	16.7	40	26.7
	▪ Handle by myself	12	80	67	51.9	4	66.7	83	55.3
	▪ Others	3	20	23	17.8	1	16.7	27	18
	Total	15	100	129	100	6	100	150	100

Cleaning up the confinement is a very common activity done by majority of respondents. Eighty eight percent (132 respondents) of total respondents mention they cleaned up their duck confinements, and 18 respondents said never clean up the confinement. Frequency of cleaning up the confinement vary within interviewed farmers in each district area, but in general figure most of respondents clean up confinements with uncertain frequency and prefers depend on weather condition which is give a big influences to the confinement humidity (Table 38).

**Table 38. Frequency and the way to clean up confinements by respondents in each district area**

No	Classifications	Pemalang		Brebes		Cirebon		Subang		Tangerang		T o t a l	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Cleaning up the confinement :												
	▪ Yes	26	86.7	26	86.7	26	86.7	25	83.3	29	96.7	132	88
	▪ No	4	13.3	4	13.3	4	13.3	5	16.7	1	3.3	18	12
	T o t a l	30	100	30	100	30	100	30	100	30	100	150	100
2	Frequency of cleaning the confinement :												
	▪ Twice per day	-	-	-	-	6	23.1	-	-	-	-	6	4.5
	▪ Once per day	-	-	3	11.5	4	15.4	1	40	5	17.2	13	9.8
	▪ Once in 2 days	14	53.8	3	11.5	7	26.9	6	24	5	17.2	35	26.5
	▪ Once in 3 days	5	19.2	9	34.6	5	19.2	3	12	1	3.4	23	17.4
	▪ Others	7	26.9	11	42.3	4	15.4	15	60	18	62.1	55	41.7
	T o t a l	26	100	26	100	26	100	25	100	29	100	132	100
3	The way to clean confinements												
	▪ Sweeping	4	15.4	5	19.2	17	65.4	4	16	15	51.7	45	34.1
	▪ Sweeping and give some disinfectants	-	-	5	19.2	3	11.5	-	-	2	6.9	10	7.6
	▪ Others	22	84.6	16	61.5	6	23.1	21	84	12	41.4	77	58.3
	T o t a l	26	100	26	100	26	100	25	100	29	100	132	100

In scavenging system, 10 respondents who said their cleaning up the confinements do the activity in different frequency. Cleaning up the confinements with other ways as show on Table 39 means cleaning up the confinement by scratching the floor or confinement litter and replace old husk with the new one for increasing confinement warmth. Some farmers squirt a petroleum and scattered a salt around the confinement to prevent natural predator such as snakes. All respondents who do scavenging system and do fully feeding to the ducks said that they cleaned up the confinements with other ways mentioned above. Only respondents who give additional feed besides herding the ducks cleaned up the confinements by sweeping (38.5%) and also use the disinfectans (8.5%). Other as answer of respondents on frequency of cleaning confinement means they only cleaned confinement in uncertain time, when they have a time or when they think the confinement is humid enough and need to be cleaned.

**Table 39. Frequency and the way to cleaning up confinements by respondents based on duck feed resources**

No	Classifications	Free range – scavenging system		Free range with additional feed		Fully feeding		T o t a l	
		N	%	N	%	N	%	N	%
1	Cleaning up the confinement :								
	▪ Yes	10	66.7	117	90.7	5	83.3	132	88
	▪ No	5	33.3	12	9.3	1	16.7	18	12
	T o t a l	15	100	129	100	6	100	150	10
2	Frequency of cleaning the confinement								
	▪ Twice per day	-	-	6	5.1	-	-	6	4.5
	▪ Once per day	1	10	12	10.3	-	-	13	9.8
	▪ Once in 2 days	1	10	33	28.2	1	20	35	26.5
	▪ Once in 3 days	4	40	19	16.2	-	-	23	17.4
	▪ Others	4	40	47	40.2	4	80	55	4.7
	T o t a l	10	100	117	100	5	100	132	100
3	The way to clean confinements :								
	▪ Sweeping	-	-	45	38.5	-	-	45	34.1
	▪ Sweeping and give some disinfectants	-	-	10	8.5	-	-	10	7.6
	▪ Others	10	100	62	53	5	100	77	58.3
	T o t a l	10	100	117	100	5	100	132	100

## 5. Marketing System

Marketing system of ducks output by majority respondents (78.7%) done by a collector or middleman. Some farmers directly can make a contact because have a connection with a middleman, other farmers sell egg through the group of farmers who will continue to sell to a collector. Frequency of selling egg vary from everyday to once in two weeks. Majority respondents shed egg to group of farmers or directly to the collector/middleman everyday (52.7%). The collector will collect eggs from farmer and then send it to markets. Several farmers sell eggs directly to the customer around they live, the customer in the market or send eggs to hatchery places. Nothing do to the egg collected by farmers from the confinement before go to marketing cycles (Table 40).

**Table 40. Marketing system done by respondents in each district area**

No	Classifications	Pemalang		Brebés		Cirebon		Subang		Tangerang		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Frequency of selling output of the farm :												
	▪ Once a week	-	-	1	3.3	-	-	-	-	6	20	7	4.7
	▪ Once in 2 weeks	-	-	1	3.3	-	-	-	-	-	-	1	0.7
	▪ Everyday	12	40	22	73.3	27	90	9	30	9	30	79	52.7
	▪ Every 2 days	14	46.7	1	3.3	3	10	8	26.7	8	26.7	29	19.3
	▪ Every 3 days	3	10	1	3.3	-	-	5	16.7	5	16.7	25	16.7
	▪ Every 4 days	-	-	1	3.3	-	-	1	3.3	1	3.3	3	2
	▪ Every 5 days	1	3.3	3	10	-	-	1	3.3	1	3.3	6	4
	Total	30	100	30	100	30	100	30	100	30	100	150	100
2	To whom sell the output :												
	▪ Collector	25	83.3	25	83.3	26	86.7	29	96.7	13	43.3	118	78.7
	▪ Small seller	-	-	-	-	2	6.7	-	-	16	53.3	18	12
	▪ Directly to the home customer	-	-	2	6.7	-	-	1	3.3	-	-	3	2
	▪ Directly to the customer in the markets	-	-	3	10	-	-	-	-	1	3.3	4	2.7
	▪ Other	5	16.7	-	-	2	6.7	-	-	-	-	7	4.7
	Total	30	100	30	100	30	100	30	100	30	100	150	100
3	Origin of buyer :												
	▪ From around area within the village	23	76.7	22	73.3	18	60	26	86.7	16	53.3	105	70
	▪ From other sub-district / other district	7	23.3	6	20	11	36.7	4	13.3	14	46.7	42	28
	▪ From other province	-	-	2	6.7	1	3.3	-	-	-	-	3	2
	Total	30	100	30	100	30	100	30	100	30	100	150	100
4	The way come to the customer												
	▪ You deliver it	11	36.7	5	16.7	13	43.3	4	13.3	4	13.3	37	24.7
	▪ The customer comes to get it	19	63.3	25	83.3	17	56.7	26	86.7	26	86.7	113	75.3
	Total	30	100	30	100	30	100	30	100	30	100	150	100

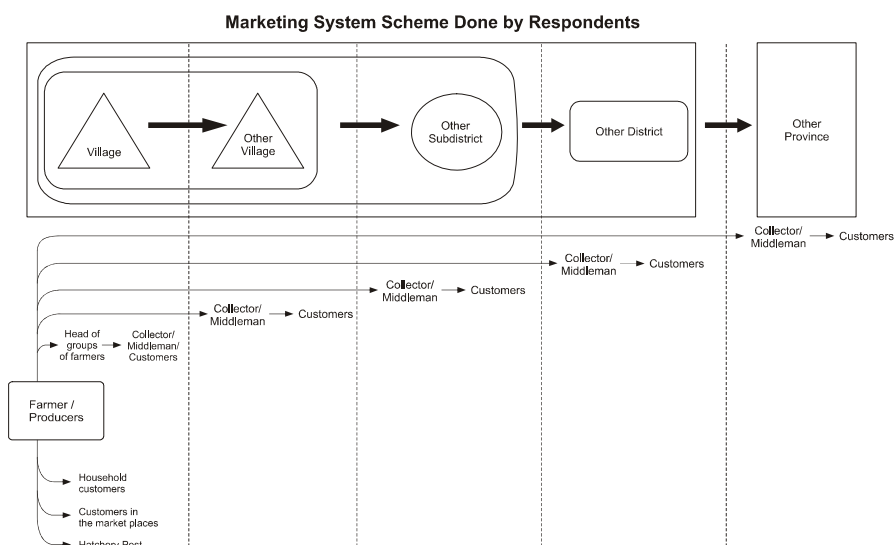
Marketing system done by all respondents based on duck feed resources also use the collector role in majority numbers (Table 41). They collect eggs everyday, and the collector will collect in 1-3 days depends on each collector. The collector or middleman usually also as buyer-up who will supply all of the farmers needs, including provide money-loan. The farmer's debt will be calculated by shedding egg to the collector. Therefore egg price in farmers level is not very fluctuative because of buyer-up who decide the price at all the time.

**Tabel 41. Marketing system done by respondents based on duck feed resources**

No	Classifications	Free range - scavenging system		Free range with additional feed		Fully feeding		Total	
		N	%	N	%	N	%	N	%
1	Frequency of selling output of the farm :								
	▪ Once a week	1	6.7	6	4.7	-	-	7	4.7
	▪ Once in 2 weeks	1	6.7	-	-	-	-	1	0.7
	▪ Everyday	6	40	69	53.5	4	66.7	79	52.7
	▪ Every 2 days	2	13.3	27	20.9	-	-	29	19.3
	▪ Every 3 days	3	20	20	15.5	2	33.3	25	16.7
	▪ Every 4 days	-	-	3	2.3	-	-	3	2
	▪ Every 5 days	2	13.3	4	3.1	-	-	6	4
	Total	15	100	129	100	6	100	150	100
2	To whom sell the output :								
	▪ Collector	15	100	97	75.2	6	100	118	78.7
	▪ Small seller	-	-	18	14	-	-	18	12
	▪ Directly to the home customer	-	-	3	2.3	-	-	3	2
	▪ Directly to the customer in the markets	-	-	4	3.1	-	-	4	2.7
	▪ Other	-	-	7	5.4	-	-	7	4.7
	Total	15	100	129	100	6	100	150	100
3	Origin of buyer :								
	▪ From around area within the village	10	66.7	90	69.8	5	83.3	105	70
	▪ From other sub-district / other district	5	33.3	36	27.9	1	16.7	42	28
	▪ From other province	-	-	3	2.3	-	-	3	2
	Total	15	100	129	100	6	100	150	100
4	The way come to the customer :								
	▪ You deliver it	3	20	34	26.4	-	-	37	24.7
	▪ The customer comes to get it	12	80	95	73.6	6	100	113	75.3
	Total	15	100	129	100	6	100	150	100

Figure 3 show the general scheme of marketing system done by all respondents. Middleman has an important role in almost all part of marketing system.

**Figure 3. Marketing system scheme done by all respondents**



## 6. Respondents Experiences on Avian Influenza

Based on answer of all respondents, 10 out of 150 respondents (6.7%) said that an outbreak of Avian Influenza occurred in their area, while 140 other respondents said the outbreak were never occurred. The last answer means they really know that never happen the case of AI in their area and they didn't hear or didn't know exactly if the case ever happen in their area.

Four respondents of Pemalang district mentioned that outbreak of Avian Influenza occurred in 2003, while 3 respondents from District of Brebes mention case of AI occurred in 2002 (1 respondent) and in 2005 (2 respondents). Two respondents from Cirebon district mentioned case happened in 2004 and 1 respondent from Tangerang district did not answer because he did not remember when the case was happened.

From ten respondents who know about an outbreak of Avian Influenza, 4 of them admitted their fowls infected by AI which are 2 respondents from Brebes district, 1 respondent from Cirebon district and 1 respondent from Tangerang district. If it identify based on duck feed resources, all respondents mention their fowls attacked by AI (4 respondents) included into group of farmer who give additional feed besides herding the ducks. Figuration of Avian Influenza case happened based on respondents information show on Table 42 (in each district) and Table 43 (based on duck feed resources).

**Tabel 42. Figuration of Avian influenza case based on respondent information in each district area**

No	Classifications	Pemalang		Brebes		Cirebon		Subang		Tangerang		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Do your area ever get an epidemic Avian Influenza?												
	▪ Yes	4	13.3	3	10	2	6.7	-	-	1	3.3	10	6.7
	▪ No	26	86.7	27	90	28	93.3	30	100	29	96.7	140	93.3
	Total	30	100	30	100	30	100	30	100	30	100	30	100
2	Year of an epidemic :												
	▪ 2002	-	-	1	33.3	-	-	-	-	-	-	1	10
	▪ 2003	4	100	-	-	-	-	-	-	-	-	4	40
	▪ 2004	-	-	-	-	2	100	-	-	-	-	2	20
	▪ 2005	-	-	2	66.7	-	-	-	-	-	-	2	20
	▪ Tidak Menjawab	-	-	-	-	-	-	-	-	1	100	1	10
	Total	4	100	3	100	2	100	-	-	1	100	10	100
3	Do your fowls also attacked by AI?												
	▪ Yes	-	-	2	66.7	1	50	-	-	1	100	4	40
	▪ No	4	100	1	33.3	1	50	-	-	-	-	6	60
	Total	4	100	3	100	2	100	-	-	1	100	10	100

**Tabel 43. Figuration of Avian influenza case based on respondent information and also based on duck feed resources**

No	Classifications	Free range - scavenging system		Free range with additional feed		Fully feeding		Total	
		N	%	N	%	N	%	N	%
1	Do your area ever get an epidemic Avian Influenza? ▪ Yes ▪ No	1 14	6.7 93.3	7 122	5.4 94.6	2 4	33.3 66.7	10 140	6.7 93.3
	Total	15	100	129	100	6	100	150	100
2	Year of an epidemic : ▪ 2002 ▪ 2003 ▪ 2004 ▪ 2005 ▪ Tidak Menjawab	- - - 1 -	- - - 14.3 -	1 2 2 1 1	14.3 28.6 28.6 14.3 14.3	- 2 - - -	- 100 - - -	1 4 2 2 1	10 40 20 20 10
	Total	1	100	7	100	2	100	10	100
3	Do your fowls also attacked by AI? ▪ Yes ▪ No	- 1	- 100	4 3	57.1 42.9	- 2	- 100	4 6	40 60
	Total	1	100	7	100	2	100	10	100

Three out of 140 respondents who answered that never been found an epidemic AI on this area said their fowls died because of AI. All respondents mentioned above was from District of Tangerang and included into group of farmers who give additional feed besides herding the ducks. The constrains answer said there is no epidemic case found on their area but their ducks died because of Avian Influenza can happen because of several reason. It could be respondent probably did not know exactly if the case happen in their area, or it might be happened not in their village but in the other district or sub-district (Table 44).

**Table 44. Percentange of respondent who said never been found AI on their area but their fowls died because of AI**

No	Never been found AI in respondent area	Pemalang		Brebes		Cirebon		Subang		Tangerang		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1	Do your fowls attacked by AI? ▪ Yes ▪ No	- 26	- 100	- 27	- 100	- 28	- 100	- 30	- 100	3 26	10.3 89.7	3 137	2.1 97.9
	Total	30	100	30	100	30	100	30	100	30	100	30	100

General illustration about respondents who have fowls attacked by AI show on Table 45. Three out of 7 respondents who their fowls attacked by AI choose not to report that case to animal health district officer. They just believe in information from other farmers. There is no obvious reason why farmer wouldn't report the case to animal health district officer (just do not want to

report), because they think it was a destiny, or because they think it was a risk as a farmer. They mentioned never get any information about Avian Influenza from animal health district officer. They only get not clearly information from other farmers and by watching television. Died fowls thrown to the rivers by the respondents. The sick animal get some medications, but there are also slaughtered for own consumption or for sale. Healthy animal is still keep by farmers, some farmers separate that fowl in other special confinement. All tools and confinement had been use by sick animal were washed up with water and soap, without desinfectans.

Farmers who report high mortality of their fowls to animal health district officer mentioned that they get a fast response from animal health district officer, but some of the officer very slow on giving a response. Suggestions given by animal health district officer are : burried in died fowls, separate and give some medications to the sick animals, separate and taking care for health fowls, cleaning up and give some desinfectans to all tools and confinement had been in contact with sick animals.

**Table 45. Illustration of respondents who have fowls attacked by AI**

No	District of respondents	Died fowls because of AI	Number fowls died because of AI	Origin information of AI diagnosa	Report to the animal health district officer
1	Brebes	Chicken	12	Other farmers	No
2	Brebes	Chicken	10	Other farmers	No
3	Cirebon	Duck	300	Animal health district officer	Yes
4	Tangerang	Chicken	10	Animal health district officer	Yes
5	Tangerang	Ducklings	4000	Other farmers	No
6	Tangerang	Duck	120	Animal haelth district officer	Yes
7	Tangerang	Duck	300	Other farmers	No

### 6.1.3. Result of District Officer's Questionnaire

#### 1. General Problems and Trouble Shooting Done in Duck Farming

General problems had been found in all district areas almost similar (see Annex 3). The problems are supply of feed (both in uncertain provide by nature or in fluctuating of prices), low of output prices and lack of funds or access to the capital. Other base problems are low of public awareness and wide distributions



of duck farmers especially the farmers do the traditional/extensive system husbandry.

Trouble shooting had been done by district officers to handle the problems such as giving a capital rent with low interest, held a presentation of public awareness program, do several trainings for continuing education and propose to do more intensive system husbandry for extensive farmers.

## **2. Experiences of District Officer on Handling of Avian Influenza Case**

Based on result of District Officer's Questionnaire from 5 (five) locations of the survey show that had been ever found Avian Influenza cases in their district area (see Annex 3). Kinds of fowls attacked by AI vary in each district area which are broilers/layers, quails, Muscovy ducks and '*Cemani*' chickens. Sub-district areas or villages identified had gotten AI case were different with sub-districts or villages for locations of the survey. This is one reason why found unmatched answers of farmers about case of AI happened in their area with actually case happened. Mostly of respondents didn't know about cases AI happened outside their village or their sub-district area.

All district officers in location of the survey use clinical and laboratory diagnose for identifying AI case. They also do the anatomy and pathology diagnose. All district areas did not have any laboratories with capability on AI diagnose especially on serological diagnose. They must send the sample to qualified laboratories and needed 2-15 days for getting the result depending on the distance of laboratories. Several laboratories for AI diagnose are Research Institute of Veterinary Science (Bogor), Diseases Investigation Center (BPPV) (Wates, Jogjakarta), Animal Health Laboratory of Livestock Department (Province of West Java) and *UPTD Balai Penyidikan Penyakit Hewan dan Kesmavet* (Research Institute of Animal Diseases and Veterinary Public Health / Animal Diseases Center) (Cikole, Lembang).

Standard Operation Procedure done by all district officers on handling AI case based on 9 (nine) step had been issued by government which is implemented in Decree of Director of General Livestock Services No. 17/Kpts/PD.640/F/02.04. The 9 (nine) steps are bio security, vaccination, depopulation, control movement, surveillance, restocking, stamping out, public awareness, monitoring and evaluation. The procedure mentioned above not all can be implemented because there are several problems had been faced. The problems are lack of facilities, lack of man powers, lack of funds, lack of the regulations of compensations both in center and district level and also low of public awareness.

The decree also use for preventing infection or reinfection of AI cases. Avian Influenza vaccinations done by all districts in 2-3 times. Standard facilities for doing vaccination had been provided by each district such as refrigerator and cooler boxes, but not all districts have indicator of vaccine temperature.

Regulation of slaughtered sick animal still becomes big problems in district level. This is related with lack of fund for compensation. District of Tangerang and Cirebon did not do the slaughter of sick animal regulation. District of Pematang do the regulation depending on funds provided by Centre Government. They paid 3,000 rupiahs/head of broiler and 1,000 rupiahs/heads of quails for compensation prices. District of Subang and Brebes do the slaughter regulation without giving any compensation. They just laid on public awareness. Related with the fund problems, the regulation done in each districts was different. District Pematang and Brebes do the slaughter regulation to all animal in the same cage of infected animal, while District of Subang do the slaughter regulation to the sick animal only.

## 6.2. Discussion

### 6.2.1. Identification of Key Risk Areas in the Production System/Cycles for Possibility of HPAI Transmission

**Table 46. Key risk areas identified in the production system/cycles run by respondents for possibility of HPAI transmission**

No	Classifications	Free range - scavenging system	Free range with additional feed	Fully feeding
1	Movement of duck from one rice-field area to other area	Yes	Yes	No*
2	Contact with other fowls or animal	Yes	Yes	Yes
3	Contact with human	Yes	Yes	Yes
4	Improper feeding system	No*	Yes	Yes
5	Bad sanitation	Yes/No*	Yes	Yes
6	Improper handling of death duck	Yes	Yes	Yes
7	Improper handling of sick duck	Yes	Yes	Yes
8	Improper handling of by-product	Yes	Yes	Yes
9	Improper handling of farm out put	Yes	Yes	Yes
10	Low farmers awareness of the disease	Yes	Yes	Yes

*Note : (\*) means the system did not do or have relation with the item*

Movement of duck from one area to other area considered to have a high possibility in spreading viruses of HPAI. Recent studies found healthy ducks

excreting sufficient amount of virus to sustain transmission and act as reservoir from which the virus can spread through water contamination, resulting in local amplification, persistence and secondary spread to terrestrial poultry. Trade and movement of live birds, including fighting cocks, and live-bird markets have also been identified as potential risk factors in the spread of HPAI caused by H5N1 (Gilbert et. All, 2006).

Contact between duck and other animals or human in the same place also have a high risk especially when the duck are infected by viruses, either not infected, it still give a risk because duck as natural reservoir of the virus. Free range – scavenging system have high risk to present of contact between duck and other animal or human. In the semi intensive confinement, ducks have possibility contact with human who take care for them or other human visit the cage. Semi intensive confinement with not good bio security allowed other birds such as chicken, pigeon, geese or other birds belongs to farmer also comes and shed in the ducks confinement.

Improper feeding system and bad sanitation also can included as a risk key in context of spreading of HPAI although both are also as a high risk for other diseases.

Improper handling of dead duck such as throw away on unused pond or river, improper handling of sick duck such as not giving any treatment or mixing between sick animal and healthy duck also give a high risk.

Improper handling of by-product and farm output also considered as a risk key in context of spreading of HPAI. Free range – scavenging system allowed manure of ducks on the rice field area without any treatment to be done. In the context of HPAI transmission, the manure contains virus have a high risk to be spread to enclosure or other birds, mammals or human.

Based on result of questionnaire, there were no treatment done after egg collected by farmers until come to the middleman or on handling manure as by-product of the farm. Sufficient information also can not be obtained if the middleman move from one infected poultry to other free poultry during collecting eggs. Trade of live animals and animal products within and away from infected areas have been proposed as potential pathways for the spread of HPAI (Gilbert et. all, 2006). Low awareness of farmers about HPAI also have a high risk in spreading of the disease because they will not do anything to prevent or handle the cases.

### 6.2.2. Percentage of Farmers Choosing Not to Restock or Switching to Other Species

**Table 47. Percentage of farmers choosing not to restock or switching to other species**

No	Classifications	Free range - scavenging system		Free range with additional feed		Fully feeding		Total	
		N	%	N	%	N	%	N	%
1	What do you feel about AI related to your duck?								
	▪ Still want to rear duck but also worry if our duck infected by AI	-	-	40	39.2	2	40	42	36.5
	▪ Still want to rear duck but also afraid if my family and me can be infected AI by the duck	-	-	14	13.7	-	-	14	12.2
	▪ Still want to rear duck but more strickly to control the sick duck	-	-	7	6.9	2	40	9	7.8
	▪ Still want to rear duck without worry or afraid to AI	8	100	41	40.2	1	20	50	43.5
	Total	8	100	102	100	5	100	115	100

Based on result of the study, several respondents (2.6% or 4 out of 150 respondents) stated that their duck farming had experiences to be infected by AI. Most of the respondents are not afraid to be exposed to the disease, in fact all the farmer still wanted to continue to run duck farming although there were AI cases in their farm. As show on Table 47, 115 out of 150 respondents (76.7%) answered they still want to rear duck. While 35 out of 150 respondents did not answered the question because they are confused to decide between still want to keep the duck or restock to other animal because they have no capital.

Besides practices of rearing ducks was very common and learned by generation, so majority of respondents are used to run duck farming since long time ago.

### 6.2.3. The Response from the Government

The Government has already taken measures to control HPAI by stipulate 9 (nine) strategies of AI control which is stated in the Decree of Director General of Livestock Services No 17/ KPTS/PD.640/02.04 dated February 4<sup>th</sup>, 2004, follows. The 9 (nine) strategies are as follows:

1. Improvement of bio-security
2. Vaccination in infected and suspected areas
3. Depopulation (selective culling) and compensation

4. Control movement of live poultry, poultry products and farm waste
5. Surveillance and tracing back
6. Restocking
7. Stamping out in newly infected areas
8. Public awareness
9. Monitoring and evaluation

The implementation of the nine strategies to control Avian Influenza according to the Decree of The Director General of livestock services of Indonesia currently is not applicable to all poultry farming, in fact the legislation only covered chicken farming. Implementation of these strategies in large scale (sector 1&2) poultry farming proof to reduce the Avian Influenza cases in Indonesia. In small scale (sector 3&4) poultry farming these strategies hardly applicable due to many complex problem in implementing the strategies so that the Avian influenza could not controlled and tend to spread to other areas which is previously free from Avian influenza.

Related to the AI control in Indonesia, the Government has already issued many regulations/legislation and established instrument in controlling AI such as National Committee for Avian Influenza in national level, task force Avian Influenza, CMU (Campaign Management Unit), *Posko AI*, *Crisis Center* in Department of Agriculture level. In the Regional and district level established the Local Disease Control Centre for AI.

Avian Influenza control program in Indonesia has not covered the duck farming sector. Recent studies related to Avian Influenza cases in duck farming in Indonesia are very limited so that information regarding Avian Influenza in duck is has not been revealed. Ducks and other water fowls are reservoirs of Avian Influenza virus without clinical symptoms. The lack of Avian Influenza control program for ducks may cause problems in controlling the disease in poultry generally.

#### **6.2.4. Review of potential options for production system for the future to reduce the risk of HPAI transmission**

Based on result of the study done by the Faculty of Veterinary Medicine – IPB in Sumatera and Kalimantan , AI virus (H5) could be detected in healthy ducks, Muscovy ducks and geese (RT-PCR). Furthermore, AI virus (H5) could be easily detected in ducks, Muscovy ducks and geese both seropositive and seronegative results without showing any morbidity or mortality. One of the conclusion from the seroepidemiology study showed that backyard farming especially ducks and muscovy ducks has higher potential as Reservoirs in comparison with chicken.

To reduce the risk of AI spread, some improvements can be applied in the free range ducks farming system in Indonesia especially because of the ducks

movement from one rice field area to other areas. Improvements should be done in all parts of husbandry and production systems practices as explained in the risk key areas identified.

Switching of the free range – scavenging system into semi-intensive system (without herding the ducks outside of the confinement) and into intensive husbandry systems with good biosecurity applied are potential options for production system for the future to reduce the risk of HPAI transmission. Nevertheless, the decision due to the option needed further investigation and analysis to know more the problems in implementation of the system to farmers related with social and economical problems.

Reducing or eliminating free range duck system is not a wise decision before we can explain clearly the relation of free range ducks with the outbreak of Avian Influenza in Indonesia. Farmers only can accept the relation of ducks with Avian Influenza when they get the clinical signs of the disease in duck. In fact, ducks was reservoir without showing the clinical signs. Further studies and investigations needed to get the answer to convince farmers due to the role of duck as potential reservoir of Avian Influenza. In addition, analytical study related to economic and sosio-cultural aspect of farmers needed to know how the policy can be implemented.

## **VII. CONCLUSION AND RECOMMENDATION**

### **7.1. Conclusion**

Conclusion of the study is that free-range duck farming systems in Indonesia has possibility role in spreading of HPAI viruses by identifying several key risk areas in the production systems/cycles of free-range duck system husbandry. This conclusion need to be more analyzed with further serological study and other laboratory diagnostic studies in the context of HPAI in ducks. Optional duck production system for the future is improvement of free-range duck systems in Indonesia and applying a better biosecurity in semi intensive duck husbandry system. Besides the 9 (nine) strategies of Avian Influenza prevention which is stated in the Decree of Director General of Livestock Services No 17/KPTS/PD.640/02.04 and established instrument in controlling AI, needed other legislation and regulation especially on free-range duck husbandry system based on economical and social condition analysis of Indonesian duck farmers.

## 7.2. Recommendation

1. Further study on the role of ducks in spreading AI H5N1 virus should be conducted, such as :
  - The duck seroepidemiological study
  - The duck comparative – seroepidemiological study based on the husbandry system and based on duck production system
  - The seroepidemiological study in chicken within the duck free range area
  - The study on Avian Influenza vaccination effect in duck
  - The study on control and shedding virus monitoring in duck
2. AI control programme in Indonesia should be also focused on ducks since they are reservoirs of AI H5N1 virus.
3. Improvement of farmers knowledge and awareness about Avian Influenza.
4. Free range duck system should be improved, such as :
  - Movements of ducks should be controlled well
  - Mass vaccination should be carried out and followed by monitoring programme
  - DODs come from free AI breeders
  - Improvements of rearing systems e.g. sanitation, handling of dead ducks
  - Increase of biosecurity application

## References

- Anonymous. 2003. Pengembangan Sensus Pertanian 2003 Kabupaten Tangerang. Kerjasama Badan Pusat Statistik Kabupaten Tangerang dengan Badan Perencanaan Daerah Kabupaten Tangerang.
- Anonymous. 2005. Data Kelompok Tani Ternak dan Perkembangan Ternak Pemerintah. Kegiatan Pengelolaan Penyebaran dan Pengembangan Ternak Pemerintah. Dinas Peternakan Pemerintah Daerah Kabupaten Cirebon.
- Anonymous. 2005. Statistik Peternakan. Direktorat Jenderal Peternakan, Departemen Pertanian Republik Indonesia.
- Gilbert, et all. 2006. Free-grazing Ducks and Highly Pathogenic Avian Influenza, Thailand. <http://www.cdc.gov/ncidod/EID/vol12no02/05-0640.htm>
- Murtisari,et all. 2000. Model Usaha Ternak Itik dalam system Petanian dengan Indek Pertanaman Padi tiga kali Per Tahun (IP Padi 300): 2. Produktivitas selama 12 Bulan. Prosiding Seminar Nasional Peternakan dan Veteriner. Pusat penelitian Peternakan, Balai penelitian dan Pengembangan Pertanian, Departemen Pertanian, Bogor.
- Prijono, Walujo Budi. 2004. Laporan Hasil Penyidikan Penyakit Avian Influenza (AI) pada Itik di P. Jawa Tahun 2004. Balai Besar Veteriner Wates, Yogyakarta.
- Rangga Tabu, et all. 2006. Laporan Kajian Avian Influenza di Jawa Timur, Jawa Tengah dan Daerah Istimewa Yogyakarta. Fakultas Kedokteran Hewan Universitas Gadjah Mada Yogyakarta.
- Samosir, D.J. 1983. Ilmu Ternak Itik. Penerbit PT Gramedia, Jakarta.
- Soejoedono, et all. 2005. Laporan Akhir : Kajian Seroepidemiologi Penyakit Avian Influenza serta strategi Penanggulangan dan Pencegahannya di Sumatera dan Kalimantan. Fakultas Kedokteran Hewan Institut Pertanian Bogor dan Departemen Pertanian Republik Indonesia.
- Tanujaya, Regina. 1992. Daya Tetas dan Produksi Telur Itik Lokal yang Dipelihara Secara Intensif. Fakultas Peternakan Institut Pertanian Bogor.
- Widjaja, Kartika. 2003. Peluang Bisnis Itik. Penerbit Penebar Swadaya, Jakarta.



## Annex 1:

## Form A

## QUESTIONNAIRE FOR DISTRICT OFFICER

Date of survey : .....

Name of Enumerator : .....

1. Name of Institution : .....
- Address : .....
- .....
- District/City : .....
- Province : .....
- Telephone & Fax : .....

- ## 2. Respondent Identity

Name : \_\_\_\_\_  
Position : \_\_\_\_\_

- ### 3. Administrative Data

Number of Sub-District : .....  
 Number of Village : .....  
 Topography of the Area : .....

[illegible]

Geography of the Area :

4. How is the animal health manpower in your district ?

Officer	Number	Notes
Veterinarian		
Paravet		
Extension worker		

7. How is the animal health facilities in your district ?

Facilities		Number
1	Car	
2	Motor cycle	
3	Cold Chain	
	Refrigerator	
	Ice box	
4	Injection equipment	
	Standart	
	Dispossible	
5	PPE (Personal Protective Equipment)	
	Boot	
	Glove	
	Masker	
	Glasses	
	Laboratory uniform	
	Hat	

6. How many animal markets do you have in your district?

.....

.....

.....

.....

.....

.....

.....

7. What are the poultry problems, especially in ducks ?

.....

.....

.....

.....

.....

.....

.....

8. What is the efforts to solve the problems ?

.....

.....

.....

.....

.....

.....

.....

.....

**Experiences in Avian Influenza Case :**

1. Do ever happen the Avian Influnza outbreak in your district area?

- ☐ Yes
- ☐ No

2. If 'Yes', mention the area and the time of the case happen :

No	Sub-district	Village	Month - Year	Fowls attacked

3. Based on what diagnose to decide the Avian Influnza case in your district area?

- ☐ Clinical signs
- ☐ Clinical signs and laboratory diagnose
- ☐ Other, mention : .....

4. Do the district have a laboratorium with capability in AI diagnose?

- ☐ Yes
- ☐ No

5. If 'No', where do you usually send the sample to AI test?

.....

.....

.....

.....

.....

6. How long is the time needed from the sending of sample until the result you get back? ..... days
7. What steps you do when you find the AI case in your district area?  
 .....  
 .....  
 .....  
 .....  
 .....
8. Do your district have a standart operation procedure on handling of AI case?  
☐ Yes  
☐ No  
 If 'Yes', please submit the copy of the SOP.
9. What the problems you found in the implementation of standart operation procedure on handling of AI case in your district area?  
 .....  
 .....  
 .....  
 .....
10. What steps have you done to prevent the infection / reinfection of AI in your district area?  
 .....  
 .....  
 .....  
 .....  
 .....
11. Do you do the vaccination to poultry of public / community?  
☐ Yes  
☐ No
12. How many times the vaccination done to the poultry?  
☐ Once  
☐ Twice  
☐ 3 times  
☐ 4 times
13. Do the district have the facilities to support the vaccination program?

No	Facilities	Yes	No
1	Refrigerator		
2	Cooler box / termos		
3	Vaccine temperature indicator		

14. Do the district do the slaughter program to the infected animal?

- ☐ Yes
- ☐ No

15. If 'Yes', which animal to be slaughtered?

- ☐ Infected animal
- ☐ All animal in the same cage with the infected animal
- ☐ Certain distance from the case found

16. Do the district give money compensation for the animal slaughtered because of infected by AI?

- ☐ Yes
- ☐ No

17. If 'Yes', how is the average price for the compensation?

- ..... Rupiahs / head
- ..... Rupiahs / head
- ..... Rupiahs / head
- ..... Rupiahs / head
- ..... Rupiahs / head

18. Where the fund for compensation came from?

- ☐ Central government
- ☐ District government
- ☐ Both of them
- ☐ Other, mention : .....

....., ..... 2006

Officer	Enumerator

**Annex 2:**

**Form B**

**QUESTIONNAIRE FOR FARMER**

Date of survey : .....  
Name of Enumerator : .....

**I. CHARACTERIZATION OF FARMER**

1.1 Name of farmer : .....( M / F )

1.2 Age : ..... year

1.3 Address :  
• Village : .....  
• Sub-District : .....  
• District : .....  
• Province : .....

1.4 Formal Educations :  
• Elementary School : .....years  
• Junior High School : .....years  
• Senior High School : .....years  
• College/University : .....years

1.5 Type of poultry operations/bussines :  
☐ Main bussines  
☐ Additional bussines  
☐ Other : .....

1.6 Role in duck farming :  
☐ Owner  
☐ Worker  
☐ Partnership  
☐ Other : .....

1.7 How long is your experiences in duck farming ?  
☐ < 1 years  
☐ 1-2 years  
☐ 3-5 years  
☐ 6-10 years  
☐ > 10 years

1.8 What is you outside job as a duck farmer ?  
☐ Bussinesman  
☐ Civil cervant or military  
☐ Employee of private company  
☐ Agriculture farmer  
☐ Artist  
☐ Other : .....

## II. HUSBANDRY SYSTEM

### Type and number of duck

#### 2.1 Type of duck species kept :

- ☐ Alabio
- ☐ Javanese Duck
- ☐ Balinese Duck
- ☐ Mixed in species
- ☐ Other : .....

#### 2.2 Number of duck kept : .....heads

- Female : ..... heads
- Male : ..... heads
- Duckling : ..... heads

#### 2.3 Keeping of other animals :

Kind of animal	Number ( head )
Local chicken	
Layer/Broiler	
Pig	
Birds	
Goose	
Quail	
Turkey	
Pigeon	
.....	
.....	
.....	

#### 2.4 How do you treat these animals against ducks ?

- ☐ Separate completely with a certain distance
- ☐ Separate completely without distance
- ☐ Mixed completely
- ☐ Other : .....

### Raising system of duck

#### 2.5 From where is the sources of your duck ?

- Village : .....
- Sub-District : .....
- District/Town : .....
- Province : .....

#### 2.6 From where is the sources of your duck breeder ?

- ☐ My own breeder
- ☐ Buy from other farmer around
- ☐ Buy from other area, mention : .....
- ☐ Buy from the markets, mention : .....
- ☐ Other : .....

2.7 How is the age variations of the duck you kept ?

- ☐ Have the same of age
- ☐ Have a variation of age
- ☐ Other, mention : .....

2.8 How many age variations of the duck you usually have?

- ☐ Two variations of age, mention: .....
- ☐ Three variations of age, mention: .....
- ☐ More than three variations of age, mention: .....
- ☐ Other, mention :.....

2.9 How do you treat the duck with variations of age?

- ☐ Mixed
- ☐ Separate perfectly
- ☐ Other, mention: .....

2.10 How do you treat the new duck?

- ☐ Separated firstly
- ☐ Directly mixed
- ☐ Other, mention : .....

2.11 If you separate them, how do you do that?

- ☐ Inside special confinement which isolated from others
- ☐ Inside special confinement besides others
- ☐ Only have a partition in the same confinement with others
- ☐ Other, mention : .....

### Management system

2.12 What kind of feed resources for your ducks?

- ☐ By herding them
- ☐ By herding them and give them an additional feed
- ☐ Other, mention : .....

2.13 How old ae your ducks when they start to get additional feed?

..... weeks

2.14 What kind of feed you give to your ducks as additional feed?

- ☐ Industrial feed  
( Name of pabric :.....; Price :...../..... )
- ☐ Outcast fish
- ☐ Outcast feed from restaurant
- ☐ Outcast product from plant farming
- ☐ Hand made, mention : .....
- ☐ Other, mention .....



2. 15 How many times and when do the additional feed given to the ducks?
- ☐ Once, at : .....
  - ☐ Twice, at : .....
  - ☐ Other, mention : .....

### Herding System

2.16 At what age do you usually start to herd your ducks?  
.....

- 2.17 Where do you usually herd your ducks?
- ☐ Rice-field
  - ☐ Beach
  - ☐ River-bank
  - ☐ Unuse ponds (*Bekas kolam/empang*)
  - ☐ Following the canals/drain/ditch
  - ☐ Other, mention : .....

- 2.18 When do you usually go to herd your ducks?
- ☐ All season/not depend on season
  - ☐ Rainy season
  - ☐ Hot season
  - ☐ Following to the time of harvest on rice-fields
  - ☐ Other, mention : .....

- 2.19 How often do you go to herd your ducks?
- ☐ Everyday
  - ☐ Once in two days
  - ☐ Once in three days
  - ☐ Uncertain time, mention : .....
  - ☐ Other, mention : .....

2.20 At what time do you usually go to start and finish from herding your ducks?

Start	Finish	Notes
At : .....	At : .....	..... .....

- 2.21 What kind of feed which your ducks eat on herding area?
- ☐ Outcast of paddy-harvest
  - ☐ Unhulled rice/grain
  - ☐ Snail
  - ☐ Small fish
  - ☐ Worm
  - ☐ Other, mention : .....

- 2.22 How is the distance of moving in herding your ducks?
- ☐ Moving in one village (from one area to other area)
  - ☐ Moving in one sub-district (from one village to other village)
  - ☐ Moving in one district (from one village to other village – different in sub-district)
  - ☐ Moving in one province (from one village/sub-district to other village/sub-district – different in district)
  - ☐ Moving from one province to other province
  - ☐ Other, mention : .....
- 2.23 How do you do to move your ducks from one area to other area?
- ☐ By vehicles/trucks
  - ☐ By driving them away
  - ☐ By carying them on shoulder using the basket
  - ☐ Mixed in many ways, mention : .....
  - ☐ Other, mention : .....
- 2.24 In moving on such areas, do you ever pass or stay for a while at place of herding/keeping other animals? (chicken, goose, pigeon, sheep, cow, buffalo, etc)
- ☐ Yes, kind of animal : .....
  - ☐ No
  - ☐ Other, mention : .....
- 2.25 If 'yes', do your ducks herded with that animals in the same place/area?
- ☐ Yes
  - ☐ No
- 2.26 How do you get the palce/area for herding your ducks?
- ☐ Rent
  - ☐ Not rent
  - ☐ Other, mention : .....
- 2.27 If you rent it, how much are you usually have to pay for it?  
.....per .....

### Confinements

- 2.28 Do you build confinement for your ducks?
- ☐ Yes
  - ☐ No
- 2.29 What is the type of confinement you build for your ducks?
- ☐ Permanently
  - ☐ Not permanently, made from : .....
  - ☐ Other, mention : .....

2.30 If it's permanently, how is the form of your ducks confinement? (*stripe if it's not*

*necessary*)

- ☐ Only have the roof without the wall, with yard – pond – fence
- ☐ Individual/colony confinements, with yard – pond – fence
- ☐ Individual/colony confinements above the pond
- ☐ Individual/colony confinements
- ☐ Other, mention :  
.....

2.31 If it's not permanently, how do you treat to the old confinement?

- ☐ Throw it away
- ☐ Sell it out
- ☐ Reuse for new confinement
- ☐ Other, mention :  
.....

2.32 How is the density number of duck you use for making confinement?

..... head per ..... m x .....m  
..... head per confinement

### **Labour Input**

2.33 Who is become the worker?

- ☐ Yourself
- ☐ Your family
- ☐ Neighbourhood
- ☐ People outside the village
- ☐ Other, mention :  
.....

2.34 How many workers handling your ducks?

- ☐ 1-3 workers
- ☐ 4-10 workers
- ☐ More than 10 workers

2.35 Where is usually the worker live?

- ☐ Around the confinement
- ☐ In your house
- ☐ In the village people house
- ☐ Other, mention :  
.....

2.36 Do you pay them?

- ☐ Yes
- ☐ No

2.37 If 'yes', how much the average salary per month you give them?

- ☐ < Rp. 500. 000,-
- ☐ Rp. 500.000,- s/d Rp. 1.000.000,-
- ☐ > Rp.1.000.000,-

### III. PRODUCTION SYSTEM

3.1 Main purpose on duck farming :

- ☐ Egg
- ☐ Meat
- ☐ Mixed
- ☐ Breeding (to get breeder)
- ☐ Other, mention : .....

#### Egg production

3.2 If for egg as purpose, how is the egg production of your ducks?

- .....egg per day

3.3 At what age when your ducks usually start to lay? .....weeks

3.4 At what age when your ducks usually being cooling off? ..... weeks

3.5 Where do your ducks usually lay their eggs?

- ☐ Inside the confinement
- ☐ Outside the confinement, on the yard
- ☐ On the herding area
- ☐ Other, mention : .....

#### Meat production

3.6 If for meat as purpose, how is the duck weight which you sell?

- .....kg/ head

3.7 At what age do you usually sell your ducks out?

..... weeks

#### Breeding system

3.8 If for breeding as purpose, how is the precentage of all eggs you produce will go to be hatched?..... persen

3.9 How is the precentage of egg hatched? .....persen

3.10 How do you do to hatch your eggs duck?

- ☐ Naturaly system by the female
- ☐ Using the incubator
- ☐ Other, mention : .....

3.11 What do you do to the unhatch eggs?

- ☐ For your own consumption
- ☐ Sell it out
- ☐ Throw it away
- ☐ Mixed
- ☐ Other, mention : .....

### Other Products

3.12 What do you do to the your duck faeces?

- ☐ Throw it away
- ☐ For manure, for yourself
- ☐ Sell it out as a manure
- ☐ Giving to other people
- ☐ Other, mention :

.....

3.13 What do you do with the duck feathers after cutting them?

- ☐ Sell it out
- ☐ Throw it away
- ☐ Giving to other people
- ☐ Other, mention :

.....

## IV. HEALTH MANAGEMENT

4.1 Animal Health Programme for the duck :

Activity	Yes	No	Kind of product/ Vaccine Name	Diseases	Age for given
Vaccination					
Anthelmenthicum /Deworming					
Antibiotic					
Vitamin					

4.2 From where do you get the information about the Animal Health Programme for your ducks?

- ☐ Veterinarian from Animal Health Post
- ☐ District people/animal health service officer
- ☐ Other farmer
- ☐ Other, mention :

.....

4.3 Who is doing the Animal Health Programme for your ducks?

- ☐ Veterinarian from Animal Health Post
- ☐ District people/animal health service officer
- ☐ Doing by yourself
- ☐ Other, mention :

.....

4.4 How do you treat to the sick duck?

- ☐ Slaughter
- ☐ Sell it out
- ☐ Giving some medications
- ☐ Do nothing
- ☐ Other, mention :

.....

4.5 What kind of disease do you usually found on your ducks?

- ☐ Diarhea
- ☐ Cough/Sneezing
- ☐ Do not want to eat
- ☐ Paralyse
- ☐ Other, mention :

.....

4.6 Beside using the industrial medicine, have you ever use the traditional medicine by your hand-made?

- ☐ Yes, mention :

.....

- ☐ No

- ☐ Other, mention :

.....

4.7 What do you do to the death duck?

- ☐ Burned
- ☐ Burried
- ☐ Throw it away
- ☐ Do nothing
- ☐ Sell it out
- ☐ For consumption
- ☐ To be processed for fish-feed
- ☐ Other, mention :

.....

4.8 If you have high mortality number of your ducks, what do you do?

- ☐ Report to the animal health service officer/ Animal Health Post
- ☐ Handling by your self
- ☐ Other, mention :

.....

4.9 How is the average percentage of your duck mortality number per month?

..... percent

4.10 What kind of disease become the main causa of your duck mortality?

- ☐ Diarhea
- ☐ Don want to eat
- ☐ Cough/Sneezing
- ☐ Paralyse
- ☐ Other, mention :

.....

4.11 Do you clean the confinement or the yard where your ducks live?

- ☐ Yes
- ☐ No

4.12 If 'yes', how often do you do it?

- ☐ Twice in everyday
- ☐ Once in everyday
- ☐ Every 2 days
- ☐ Every 3 days
- ☐ More than every 3 days
- ☐ Other, mention : .....

4.13 How do you do to clean up your duck confinements?

- ☐ Only by sweeping
- ☐ Sweeping and giving disinfectant
- ☐ Other, mention : .....

## V. MARKETING SYSTEM

5.1 To whom you sell the output of your duck?

- ☐ Collector
- ☐ Middleman
- ☐ Directly to the customer
- ☐ Other, mention : .....

5.2 From where do the buyer come?

- ☐ From other area in the village/from other village
- ☐ From other sub-district/district
- ☐ From other province
- ☐ Other, mention : .....

5.3 How do the duck and its products come to the buyer?

- ☐ You deliver it
- ☐ They come to you to take it
- ☐ Other, mention : .....

....., ..... 2006

Remark :

Farmer	Enumerator

### Annex 3:

## RESULT OF QUESTIONNAIRE FOR DISTRICT OFFICER

**Number of animal health service officers, animal health facilities and animal markets in each district area as locations of the survey :**

No	Number ( person / each )	District Area				
		Pemalang	Brebes	Cirebon	Subang	Tangerang
<b>A</b>	<b>Animal Health Service Officers</b>					
1	Veterinarian	2	3	5	1	6
2	Para vet	13	11	14	16	7
3	Extension worker	14	18	8	22	-
<b>B</b>	<b>Animal Health Facilities</b>					
1	Car	1	2	6	1	-
2	Motor cycle	11	30	22	2	1
3	Cold Chain					
	* Refrigerator	6	8	3	6 (+2 Freezer)	7
	* Ice box	14	12	-	2	26
4	Injection Equipment					
	* Standart	10	-	Yes, we have	13	30
	* Disposable	300	-	Yes, we have	3.000	-
5	PPE ( Personal Protective Equipment )					
	* Boot	20	20	Yes, we have	2	5
	* Glove	50	-	Yes, we have	100	5
	* Masker	29	-	Yes, we have	5	-
	* Glasses	20	-	Yes, we have	5	-
	* Laboratory uniform	14	-	Yes, we have	2	5
	* Hat	20	-	Yes, we have	1	-
<b>C</b>	<b>Animal Markets</b>	14	6	4 ( Sub-district: Aryawinangu n, Klagenan, Weru, Ciledug/Pabu aran )	10	None (Only have local market / seasonal markets which are not managed by district authorities)



**Data of Area with AI Cases Recorded :**

No	District ( sub-district )	Village infected	Kind of fowls infected by AI	Time of cases	Sub-District areas as location of the questionnaire survey
<b>1</b>	<b>PEMALANG</b>				
	a. Petarukan	Klareyan	Quail	2004	1. Taman (Vill. Sitemu)
		Pegondan	Quail	2004	2. Petarukan (Vill. Bulu)
	b. Bodeh	Pendowo	Quail	2004	3. Randudongkal
	c. Taman	Kabunan	Broiler	2004	
	d. Ampel Gading	Blimbing	Broiler	2004	
	e. Comal	Purwosari	Quail	2004	
	f. Pemalang	Pelutan	Broiler	2004	
<b>2</b>	<b>BREBES</b>				
	a. Paguyangan		Layer	Agst 2003 – March 2004	1. Bumiayu
					2. Brebes
					3. Wanasari
<b>3</b>	<b>CIREBON</b>				
	a. Palimanan	Semplo	Layer	Dec 2004	1. Gebang
					2. Losari
					3. Kapetakan
<b>4</b>	<b>SUBANG</b>				
	a. Kalijati	Marengmang	Muscovy duck	Jan - 2006	1. Pusaka Nagara (Vill. Rancadoka, Sarmaja, Sukamulya, Karangsari, Pusakaratu, Bojong Tengah)
	b. Subang	Pasir- Kareumbi	Cemani chicken	Dec – 2005	2. Binong (Vill. Citrajaya)
	c. Ciasem	Ciasem- Girang	Native chicken	Jan – 2006	3. Comprang (Vill. Suka tani, Suka seneng, Bojong kedeng, Kalensari)
	d. Pamanukan	Bongas	Native chicken	Feb – 2006	
	e. Cipunagara	Kosambi	Native chicken Muscovy duck	Jan – 2006	
	f. Comprang	Kiarasari	Native chicken Muscovy duck	Jan – 2006	
	g. Pusakanagara	Rangdu	Native chicken	Jan – 2006	
	h. Cipeundeuy	Lengkong	Native chicken	Jan – 2006	
<b>5</b>	<b>TANGERANG</b>				
	a. Legok		Broiler & Layer	2003	1. Sepatan
	b. Panongan		Broiler & Layer	2003	2. Mauk
	c.. Curug		Broiler & Layer	2003	3. Pakuhaji
	d. Pagedangan		Broiler & Layer	2003	
	e. Kemiri		Broiler & Layer	2003	
	f. Rajeg		Broiler & Layer	2003	

**General problems in duck farming had been found and trouble shooting had been done in each district area :**

No		Pemalang	Brebes	Cirebon	Subang	Tangerang
1	General problems	1. Supply of feed 2. Supply of capital 3. Low awareness and knowledge of farmers	1. High prices of feed 2. Low prices of egg 3. Low number of capital (difficulties in capital access) 4. Markets handled by a middleman / buyer-up / collector 5. Uncertain supply of fresh fishes from the sea for duck feed 6. Low acceptance of farmers to applied technology	Have no big problems in general, for this time only have problems on getting hatched eggs and delaying of DODs distribution to outside areas of Java	1. Wide distribution of duck farmers 2. Extensive duck husbandry system	Traditional / backyard system in duck husbandry which is always move following sources of feed (post harvest rice-field area)
2	Trouble shooting had been done	1. Provide a capital with low interest 2. Personal communication to farmers by visiting door to door 3. Do the public awareness presentation 4. Provide several trainings	1. Continuing education to farmers / group of farmers 2. Strengthening in capital side 3. Provide trainings for farmers 4. Transferring usefull applied technology 5. Increase the independency of group of farmers	1. Selection on farmers group productions 2. Give an extra attention on duck sex ratio for giving hatched eggs 3. Cooling off on hatchery activities	Public awareness	Propose to more intensive duck husbandry systems

**Experience in Avian Influenza Cases :**

No	Questions	Pemalang	Brebes	Cirebon	Subang	Tangerang
1	Had you been ever found AI cases in your area?	Yes	Yes	Yes	Yes	Yes
2	Based on what diagnosa you decide it was AI?	Symptoms and laboratory diagnose	Symptoms and laboratory diagnose	Symptoms and laboratory diagnose	Symptoms and laboratory diagnose	Symptoms, laboratory diagnose and pathology-anatomy diagnose
3	Do your district have laboratorium with capability on AI diagnose?	No	No	No	No (Only for rapid test and pathology-anatomy diagnose)	No
4	Laboratorium for AI diagnose	Disease Investigation Centre – DIC (BPPV Wates, Jogjakarta )	DIC (BPPV Wates, Jogjakarta )	Animal Health Laboratory of Livestock Department (Province of West Java)	Research Institute of Animal Diseases and Veterinary Public Health / Animal Diseases Center (Cikole, Lembang).	Research Institute of Veterinary Science (Bogor), DIC (BPPV Wates, Jogjakarta )

### **Experience in Avian Influenza Cases :**

<b>No</b>	<b>Questions</b>	<b>Pemalang</b>	<b>Brebes</b>	<b>Cirebon</b>	<b>Subang</b>	<b>Tangerang</b>
5	Time frame for sample sent until get the result	14 days	2 days	6 days	3-6 days	± 15 days
6	What do you do when AI cases found on your district area?	a. Clinical diagnosa b. Pathology-anatomy diagnosa c. Blood sample taken and send to DIC	Implemented of the 9 strategic steps to control AI according to the Decree of the Director General of Livestock Services of Indonesia	1. Do the good biosecurity 2. Vaccination for health fowls 3. Stamping out (depend on condition and conciousness of farmers) 4. Surveillance	1. Slaughter step on infected fowls only 2. Vaccination for health fowls 3. Environment disinfection programme 4. Socialization of Avian Influenza	1. Isolation of infected location 2. Desinfection 3. Vaccination for health fowls 4. Destroy death fowls (burned/burried)
7	Presence of Standart operation Procedure on handling of AI cases	No, we haven't	Yes, we have	Yes, we have	Yes, we have	Yes, we have (Decree of The Director General of Livestock Services of Indonesia No.17/Kpts/PD. 640/F/02.04)
8	Problems found in the implementation of AI standart operation proceduren	There is no adequate laboratorium in the district foe AI diagnosa	No problems found	1. Lack of infrastructure and equipment 2. Lack of fund for operational 3. Lack of man power	1. Traditional / extensive husbandry system 2. Lack of equipment, transportation and man power / vaccinators 3. Lack of public participation because of the low of knowledge to the AI disease	Lack of fund for compensation program
9	Steps have been done to prevent the infection / reinfection of AI in the district area	1. Good biosecurity 2. Vaccination 3. Poultry control movement 4. Public awareness 5. Monitoring and evaluation	1. Good biosecurity 2. Vaccination 3. Poultry control movement 4. Public awareness	1. Socialization 2. Biosecurity 3. Vaccination 4. Poultry control movement	1. Vaccination 2. Desinfection 3. AI disease sosialization 4. To form an animal health community worker	1. Good biosecurity 2. Poultry control movement 3. Desinfection 4. Vaccination 5. Sosialization
10	Do you do the vaccination to the poultry of public / community?	Yes	Yes	Yes	Yes	Yes

### **Experience in Avian Influenza Cases :**

No	Questions	Pemalang	Brebes	Cirebon	Subang	Tangerang
11	How many times you do the vaccination?	Twice	Twice	3 times	3 times	3 times
12	Facilities to support the vaccination : 1. Refrigerator 2. Cooler box/ 3. Vaccine temperature indicator	Yes Yes No	Yes Yes No	Yes Yes No	Yes Yes Yes	Yes Yes No
13	Do the district do the slaughter program to the infected animal?	Yes	Yes	No	Yes	No
14	Poultry to be slaughtered	All birds in the same cage with infected bird	All birds in the same cage with infected bird	-----	Infected bird only	-----
15	Do the district give a compensation money for the slaughtered animal?	Yes	No ( slaughter program informed after March 17, 2004, district do the slaughter program before the legislation, then all done by awareness)	-----	No	-----
16	Average compensation money / head of birds	Broiler ( Rp. 3.000,-) Quail (Rp. 1.000,-)	-----	-----	-----	-----
17	Origin of the compensation money	Central government	-----	-----	-----	-----

**Annex 4:**

**FIELD ACTIVITY PICTURES**



Picture 1. Pre survey of free-range duck study



Picture 2. Pre survey to the group of farmers/"kelompok ternak"



Picture 3. Conversation with farmers on the pre survey



Picture 4. Collection of secondary data from district officer



Picture 5. Free-range-scavenging ducks on the rice-field area



Picture 6. Free-range ducks on the rice field area





Picture 7. Free-range-scavenging ducks with non permanent confinement (plastic net)



Picture 8. Non permanent confinement next to the rice-field area of free-range-scavenging ducks





Picture 9. The row of non permanent confinement of free-range-scavenging ducks



Picture 10. The row of non permanent confinement of free-range-scavenging ducks



Picture 11. Free-range ducks with additional feed



Picture 12. Free-range ducks with additional feed



Picture 13. Water canals as herding area for free-range ducks



Picture 14. Free-range ducks are herding on the river





Picture 15. Free-range ducks on limited area with feeding everyday without herding outside from the semi-intensive confinement



Picture 16. Water facility on free-range ducks with feeding everyday without herding outside from the semi-intensive confinement



Picture 17. Chopped fishes as additional feed



Picture 18. Blended fishes as additional feed



Picture 19. Bran as additional feed



Picture 20. Duck eggs collected in the farm





Picture 21. Duck eggs collected in the group of farmers



Picture 22. Local ducks as majority breeds by respondents



Picture 23. Contact of ducks with other species



Picture 24. Conversation with district officer on ducks – avian Influenza case





Picture 25. District officer questionnaire filling process



Picture 26. Farmer questionnaire filling process