



Egypt

INTERVENTIONS FOR  
IMPROVING BIO-SECURITY OF  
SMALL-SCALE POULTRY PRODUCERS  
IN EGYPT

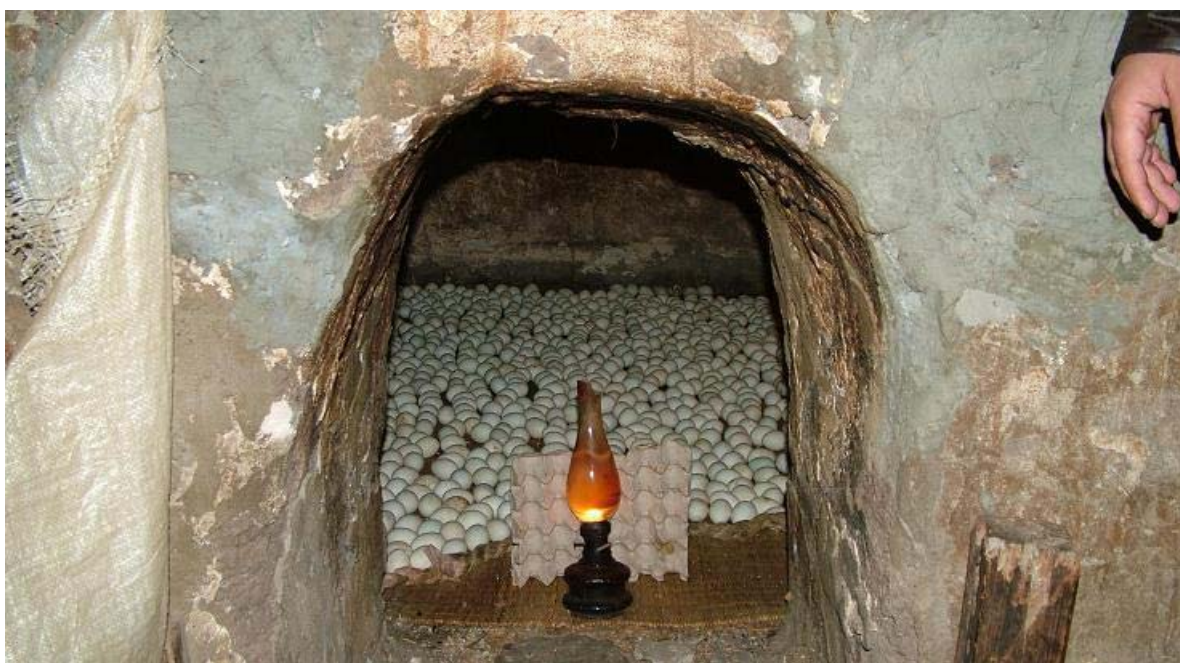


FOOD AND AGRICULTURE ORGANISATION OF THE UNITED NATIONS

**EGYPT**

**Consultative Mission**

**«Interventions for improving bio-security of  
small-scale poultry producers in Egypt»**



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National consultant

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### **Abbreviations**

AI	Avian Influenza.
CLQP	Central Laboratory for Veterinary Quality Control on Poultry Production.
DOC	Day Old Chicks.
EGP	Egyptian Pound (1 EUR = 7,583551 EGP <a href="http://www.Oanda.com">www.Oanda.com</a> 16/12/06).
FAO	Food and Agriculture Organisation of the United Nations.
GOVS	Egyptian General Organization of Veterinary Services.
GPC	General Poultry Company.
IBD	Infectious Bronchitis Disease.
MALR	Ministry of Agriculture and Land Reclamation.
NGO	Non Governmental Organisation.
ToR	Terms of Reference.

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## Executive summary

In response to the recent High Pathogenic Avian Influenza (HPAI) outbreaks in Egypt, the FAO commissioned a study to describe and analyse the local poultry sector. The aim was to identify affordable interventions for improving bio-security of small-scale poultry producers. In December 2006, two consultants visited different Governorates in Upper and Lower Egypt where they interviewed a number of stakeholders involved in the poultry sector and marketing chain.

In the last fifty years, poultry production in Egypt changed radically making it one of the most important poultry producers of Africa and the Middle-East. Up until recently the sector grew fast, with a shift from traditional to commercial and industrial production. Nevertheless, liberalisation and privatisation over the last fifteen years has revealed weakness and inefficient performance within the industry and recently production has steadily declined. Before the outbreak of HPAI there were nearly 30 000 poultry farms in Egypt, the vast majority being small to medium-size farms. It was estimated that 75 percent of the Egyptian broiler production was carried out on farms of less than 15 000 birds per cycle.

While the transformation of the Egyptian poultry production was driven by policy and economic forces, it was facilitated by the widespread practice of rearing poultry at home. The result is that the Egyptian poultry sector today is a combination of modern poultry rearing and a well developed traditional sub-sector. For example, traditional hatcheries successfully incubate annually hundreds of thousands of eggs destined primarily for home rearing. With agriculture limited by land and water availability, improving and intensifying household poultry rearing remains an important tool to reduce rural and peri-urban poverty.

The most notable feature of the traditional sector is the popularity of urban/peri-urban poultry keepings – almost exclusively chickens – fuelled by the growing human population and urbanisation. The traditional flat roof being the most common place to rear chickens but also balconies, basements, backyards, unfinished buildings and the streets themselves are also used. These systems provide a simple and affordable way to improve the household diet and generate some income for the poorest households. The poultry sector as a whole is also a source of employment with many ancillary jobs throughout the poultry chain: processing, retailing and supplying goods and services.

In general bio-security is weak. Larger farms are usually located in the countryside (and often close to each other), while smaller farms are more peri-urban. All farms confine their birds but contact with other birds is frequent. Most farms rely on veterinary advice and have scheduled prophylactic plans, but general hygiene is often poor and the condition of the infrastructure is often inappropriate or damaged.

Backyard flocks are usually a mix of birds of different ages and species and maybe free-ranging, semi-confined or confined. In addition, it is a common practice for many households to also keep a separate, second flock of either layers or broilers of the same age and breed. In general the husbandry standards are often poor.

At the beginning of 2006 HPAI was officially detected in Egypt. The reaction of the public administration was to ban live bird markets, restrict bird movement, undertake vaccination campaigns and to cull of over 40 million birds. However, the policy was not always clear and some interventions were technically unjustified and implementation was neither systematic or particularly effective. There was a high level of panic amongst the general public. Many scared producers wanted to get rid of birds and simply threw them in the street, the result was many breeders closed down and backyard producers stopped their activities.

At present, the situation is calming down. There is a higher sense of awareness about good husbandry practices and several of the old habits have partially changed. Even though HPAI is still present in the country, many farmers are now resuming production and backyard producers are restocking.

This report examines those poultry husbandry practices that reduce contact and spread of pathogens between birds. Options for improving bio-security that have direct benefits to the producer are explored. Breeding practices are evaluated and classified according to a) those that have a major bio-security impact on disease-control, and b) the main limiting factors for implementing improved bio-security practices.

The following practices were identified as representing a high bio-security risk that could feasibly be changed by modifying management practices:

- Inappropriate carcass disposal.
- Inappropriate litter disposal.
- Density and proximity between poultry farms.
- Workers' contact with other flocks..
- Contact with wild birds. .
- Inadequate quarantine for sick birds.

The report highlights the importance of:

- An appropriate HPAI vaccination policy aimed at reducing the spread of the virus as part of the overall eradication plan.
- Public and producer awareness of culling and compensation policies and the important role religious authorities have in influencing change.

Simple, clear and affordable technical advice is the starting point for persuading farmers to improve the management and bio-security. Implementing such measures will not only reduce the risk of the spread HPAI but it will make the whole sector more efficient and profitable. This will benefit both producers and consumers.

## **1. Introduction**

### **1.1. Consultancy purposes**

The ToR (full text in annex 1) requires to describe and analyse opportunities for improving bio-security in the Egyptian poultry sector 3 (small scale, commercial farms involving broilers, layers or ducks) and sector 4 (backyard, indigenous and scavenging birds in mixed farming systems).

The final paper has to provide: A clear description of the potential measures required to increase bio-security for each sector; how they can be implemented, and an evaluation of the preconditions for successful implementation, including costs. The paper should also include aspects of how to improve service delivery and marketing within different components of the market chain of the two sectors.

Although the term bio-security has a wide range of definitions, in this paper we have chosen to signify the approach to poultry husbandry aiming to prevent the contact between animals and pathogens and to decrease the spreading of germs. The reason for this being the recent outbreak of High Pathogen Avian Influenza (HPAI).

### **1.2. Calendar of the mission**

The mission in the field was planned for 21 days in December 2006 by an international and a national consultant. The field trips took place to selected Governorates during the following dates: 8.th-9.th in Giza, 12.th-13.th in Sharkia, 14.th-16.th in Dakahlia and 18.th-22.th in Fayoum. The remaining days were spent in Cairo. The list of the encountered persons is found in annex 2.

In addition, two data collectors were recruited to collect information according to a questionnaire provided by the consultants. They operated during December 2006 and January 2007. At the time of writing this report, the data from this questionnaire was not yet available.

The originally appointed national consultant could not participate due to personal reasons. He was, therefore, substituted by a member of the Central Laboratory for Veterinary Quality Control on Poultry Production (CLQP).

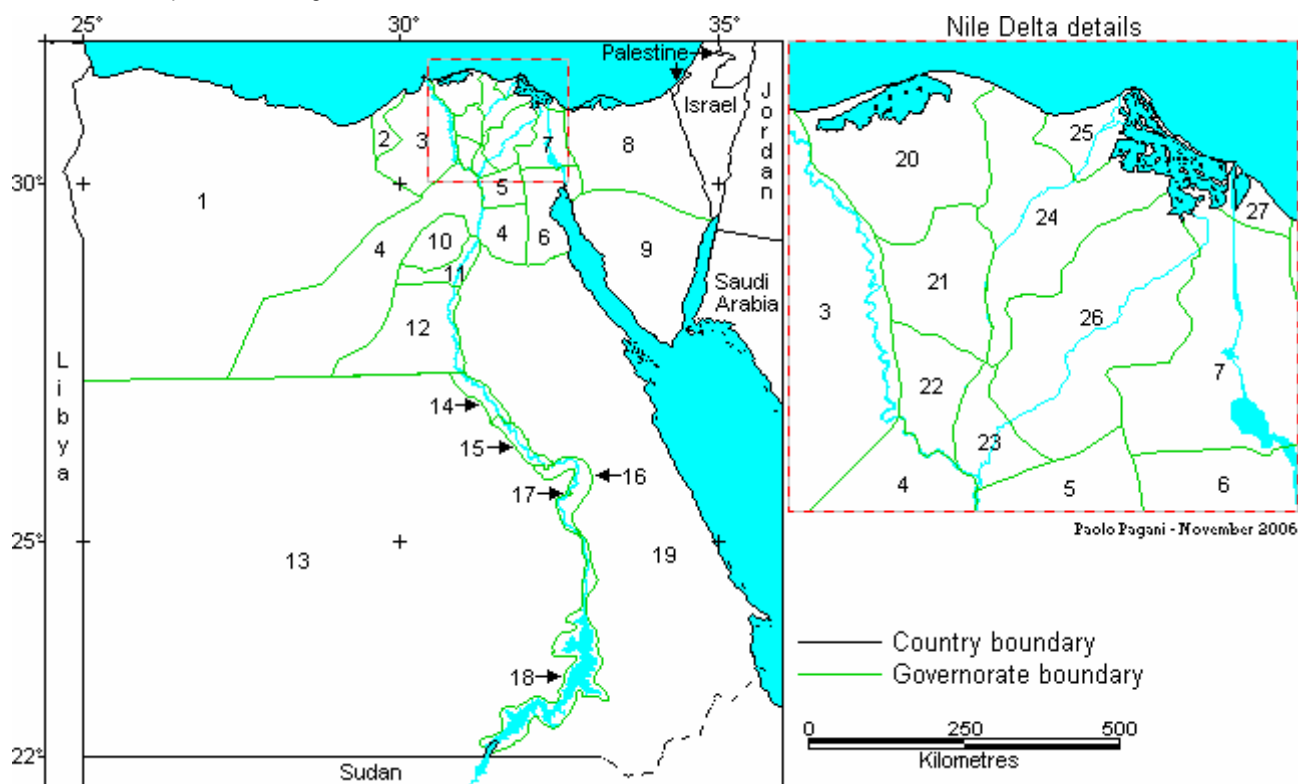
### **1.3. Methodology**

Preliminary work to prepare the study was done in order to obtain the required information. This included an investigation of secondary data, related studies and scientific bibliographies, in order to delineate the ongoing situation of both the poultry sector in Egypt and the Avian Influenza (AI). Following this, a list of people and organisations to meet was identified and, a specific questionnaire was used for each person. Two different types of questionnaires were prepared.

- A semi-structured checklist of open questions for the stakeholders of the poultry sector and the market chain. This checklist allowed for a broad dialogue and the opportunity to look further into a topic, without the risk of forgetting subjects that needed to be discussed. This type of checklist could be continuously revised and adapted to the reality of the field (see annex 3).

**Table 1.** Egypt administrative division

	Muhāfazāt (Governorate)	Anglicised	Pop. 2006	Area km <sup>2</sup>	Capital	
1	Matrūh	مطروح	Matrouh	276 261	212 112,0	Marsa Matrūh
2	Al Iskandarīyah	إسكندرية	Alexandria	3 865 502	2 679,4	Al Iskandarīyah
3	Al Beherah	البحيرة	Beheira, Behera	4 773 196	10 129,5	Damanhūr
4	Al Jīzah	الجيزة	Giza	5 760 651	85 153,2	Al Jīzah
5	Al Qāhirah	القاهرة	Cairo	7 836 243	214,2	Al Qāhirah
6	Al Suways	السويس	Suez	497 421	17 840,4	As Suways
7	Al Ismā'īliyah	إسماعيلية	Ismailia	882 247	1 441,6	Al Ismā'īliyah
8	Shamal Sīnā'	شمال سيناء	North Sinai	326 324	27 574,0	Al `Arish
9	Janūb Sīnā'	جنوب سيناء	South Sinai	69 170	33 140,0	At Tur
10	Al Fayyūm	الفيوم	Fayoum, Fayyum	2 478 230	1 827,2	Al Fayyūm
11	Banī Suwayf	بنى سويف	Beni Suef	2 304 563	1 321,7	Banī Suwayf
12	Al Minyā	المنيا	Menia, Minya	4 134 832	2 261,7	Al Minyā
13	Al Wādī al Jadīd	الوادي الجديد	New Valley	172 939	376 505,0	Al Khārijah
14	Asyūt	أسيوط	Asyout, Asyut	3 499 600	1 553,0	Asyūt
15	Sūhāj	شاهة	Suhag	3 899 304	1 547,2	Suhaj
16	Qinā	قنا	Kena, Qena	2 995 664	1 796,0	Qina
17	Al Uqsur	أقصر	Luxor	430 214	55,0	Al Uqsur
18	Aswān	أسوان	Aswan	1 133 886	678,5	Aswān
19	Al Bahr al Ahmar	البحر الأحمر	Red Sea	192 469	203 685,0	Al Ghurdaqah
20	Kafr al Shaykh	كفر الشيخ	Kafr el Sheikh	2 629 491	3 437,1	Kafr ash Shaykh
21	Al Gharbīyah	الغربية	Gharbia	3 980 509	1 942,2	Tantā
22	Al Minūfiyah	المنوفية	Menoufia, Minufia	3 285 491	1 532,1	Shibīn al Kawm
23	Al Qalyūbiyah	القليوبية	Kalyoubia, Kalyubia	3 956 791	1 001,1	Banhā
24	Al Daqahliyah	الدقهلية	Dakahlia, Dekahlia	5 005 277	3 470,9	Al Mansūrah
25	Dumyāt	دمياط	Damietta	1 095 528	589,2	Dumyāt
26	Al Sharqīyah	الشرقية	Sharkia	5 208 052	4 179,5	Az Zaqa`īq
27	Būr Sa`īd	بورسعيد	Port Said	546 776	72,1	Būr Sa`īd
	<b>Total</b>	<b>Egypt</b>		<b>71 236 631<sup>1</sup></b>	<b>1 001 450,0</b>	<b>Al Qāhirah</b>
			Internal water		3 711,0	

Modified from <http://www.world-gazetteer.com><sup>1</sup> Several other sources give over 75.000.000 inhabitants in 2006.

- A structured questionnaire with closed questions for "backyard and small poultry breeders". This questionnaire allowed for the collection of data that can be statistically studied under the condition that they are homogeneous in time and space (see annex 4). The questionnaire has been evaluated with the team of data collectors, and tested before reaching the final version that was used in the field.

Considering the duration of the mission and the extent of the region, the zones investigated by the data collectors (structured questionnaire) were limited to four governorates (Giza, Dakahalia, Fayoum and Cairo). This was made in order to have a representation of Upper and Lower Egypt and of urban, peri-urban and rural areas.

The structured questionnaire was aimed to study 345 cases:

- 45 in urban Cairo. Only poultry sector 4.
- 100 in each of the other 3 governorates. They were distributed as follows: 4 cases by village; 5 villages by district; 5 districts by governorate. In the villages, where possible, 2 cases of sector 3 and 2 of sector 4 were chosen.

In addition, the national and international consultants visited other governorates in order to compare different situations.

## 2. Egyptian poultry sector

### 2.1. Egyptian poultry sector overview.

To understand the actual situation it is important to refer to the past political and economical choices, to the geographical and social situation and to the socio-economic role of poultry.

#### 2.1.1. Political and economical background

Up to the sixties of the last century, the Egyptian poultry production was nearly completely dominated by the traditional poultry producers. During the sixties, given the growing population and the growing dependency on imported agricultural products, the State started to encourage the domestic production of poultry and supported the transformation of the agricultural sector from rural to industrial, through several economic policies. The most used were the subsidy policy, the finance policy and a policy to protect domestic production from imports through tariffs or restrictions and, in general, by a central control of the entire market chain. With this aim the General Poultry Company (GPC) was established in 1964, as a national supplier of products for poultry breeders. Sustained by a poultry feed subsidy program and low rate loans for breeders, GPC and the linked commercial poultry sector grew fast. In 1985, of the total amount Egyptian poultry meat consumption 71 % was produced by private poultry producers, 8.4 % by the public sector, 15 % imported and 5.6 % by backyard rural households<sup>2</sup>. In 1986 a total ban on poultry meat imports was established.

At the end of the eighties, a new trend started with the gradual liberalization of cropland allocations and the partial elimination of price controls and producer subsidies (including the subsidies for imported poultry feed). The effect of this partial exposure of the Egyptian market to international prices resulted in a shift to a crop production based on the relative profitability of each crop. The chain effect was a poultry industry that was more dependent on the import of feed, a substantial increase of prices and, finally, the closure of many feed mills and poultry farms<sup>3</sup>. After this first market adjustment, the poultry industry saw a period of fast growth in the nineties, and arrived to employ 1.4 million persons. In 1994 the Government initiated the sale by auction of the GPC production units. In 1995 Egypt was admitted to the World Trade Organization, with all the consequent obligations and, two years later, the ban on poultry import was replaced by an 80 % tariff rate, scheduled to decline gradually in the following years.

This new tendency of liberalisation and privatisation uncovered the still present weakness, uneconomical and inefficient performance of the poultry industry and during the period 2001-2005 the poultry production steadily dropped. This also resulted in a failure to sell off all of the GPC production units. In 2005, the rural poultry sector's share of the total Egyptian production was estimated at around 10% for the poultry meat and 30% for the egg market. In the same year, the number of broiler production units was estimated at nearly 26,000 with an annual production potential of nearly 1 billion broilers. The number of operative production units was only 79%, with a production of only 43% of the potential capacity. For commercial table eggs, of the nearly 3,000 production units (6.6 billion eggs production capacity), only 73% were operational with a production of 38% of the potential capacity<sup>4</sup>.

At the beginning of 2006 another stroke was given to the poultry sector by the official detection of HPAI in Egypt. The media played a negative role in this<sup>4</sup>. They gave wrong

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<sup>2</sup> I. Soliman. Economic Problems of poultry production in Egypt. CIHEAM. L'aviculture en Mediterranee. 1990, Sér. A (7). 283-293. <http://ressources.ciheam.org/om/pdf/a07/CI901603.pdf>

<sup>3</sup> Economic Research Service/USDA. World Agriculture & Trade. Egypt's Poultry industry at a turning point. March 1997. 21-23. [www.ers.usda.gov/publications/agoutlook/mar1997/ao238i.pdf](http://www.ers.usda.gov/publications/agoutlook/mar1997/ao238i.pdf)

<sup>4</sup> FA. Hosny. The Structure and Importance of the Commercial and Village Based Poultry Systems in Egypt. 2006.

messages and emphasized the negative effects (such as human fatalities). Furthermore, the AI was included in the speech of the Friday prayer. Altogether this caused a collective panic. In many villages people wanted to get rid of birds and simply threw them in the street. In other cases, in the wave of culling, also rabbits and other animals living in close contact with birds were sacrificed.

The reaction of public institutions was to impose restrictions on households and small-scale poultry production units, the banning of live bird markets, bird movement restrictions, a vaccination campaign and the culling of over 40 million birds. In addition, although official figures are not known, huge numbers of birds were thrown into the streets during the panic or, as suggested by local and veterinary authorities, killed and refrigerated for later consumption.

On the market, the first impact was that the consumption and price of poultry products dropped dramatically. Many breeders at the end of the cycle of production were obliged to sell with deficit and closed down. Many others saw all their poultry stamped out. At village level the majority of backyard producers stopped their production activities. Beside this, we have to remember, that during 2005-2006 Egypt was also plagued with other serious livestock diseases such as Foot and Mouth Disease, Lumpy Skin Disease and Ephemeral Fever. At the second stage, the result was an important shortage of animal protein supplies and the price of meat, milk and eggs almost doubled. To overcome this severe shortage in poultry production, the State decided to abolish the residual import tax for poultry meat (32 % prior to HPAI outbreak) up to the end of 2006. At present, the situation is calming down. Many farmers are resuming their activities and backyard producers are restocking or wish to restock again.

### 2.1.2. Socio-economic role and geographical situation

As in many other countries, also in Egypt, poultry has always been one of the main sectors in livestock production. Moreover, in Muslim countries, where pigs are socially not accepted, the role of poultry is even more important because it is one of the few domestic animals left with characteristics such as rapid reproduction, good feed conversion, flexible source of revenue and/or proteins, no need for land ownership and moderate need for investments. Furthermore, in the past century poultry rearing in Egypt has reached a strong intensification level. The best examples are the traditional hatcheries (see Box 1), where without machinery, hygrometer and thermometer, dozens of thousands of Day Old Chicks (DOC) are produced. The existence of these traditional hatcheries implies the ancestral habit of rearing birds at home in more or less large numbers, in other words, implies the existence of a traditional rural poultry pre-industry.

The rapid growth in 1964, when the GPC started the large-scale industrialisation of the poultry sector, could be explained by the already existing knowledge of poultry rearing and the willingness to accept (at least several) innovations to improve the production.

We also have to take into consideration that, although Egypt is a large country (about 1,000,000 km<sup>2</sup>), most of it is desert area, and only approximately 6.5% of the territory is inhabited/agricultural land. It means that, in an area roughly equivalent to the size of Belgium and The Netherlands together (already known as crowded), we find three times their population (over 1,000 habitants / km<sup>2</sup>). In only 45 years the population has nearly tripled (slightly less than 28 million in 1960, around 75 million in 2006) and the projections show over 101 million in 2025<sup>5</sup>. As a result, short-term agricultural gains are expected to be only minimal because yields are already high and agriculture is strongly limited by land and water

<sup>5</sup> Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects. 06/10/06. <http://esa.un.org/unpp/p2k0data.asp>

availability. Consequently, Egypt is expected to continue to be an increasingly large importer of food products. Moreover, in addition to the high urbanisation level, the landscape changes quickly and dramatically. In rural areas villages are rapidly expanding and changing, with unfinished buildings everywhere replacing the small traditional houses. Besides this, although the Egyptian economy is growing, poverty is still present and the United Nations Development Programme (UNDP) estimated the percentage of the population living below the poverty line, in 2005, at around 20 %<sup>6</sup>.

In this situation there is a need to take advantage of any possible chance to intensify the production with a minimum of investment. Combined with all the other characteristics mentioned before, poultry rearing has become a common way to improve the diet and a source of income for the majority of households. This boosted the poultry production from the base and gave origin to one of the major features of the household poultry sector in Egypt, the omnipresence of chickens in many unfinished buildings, which provided a good shelter for the small flock. This proved to be a profitable way of using these buildings.



**Egyptian village seen from the roofs**

### 2.1.3. Veterinary facilities

The public Veterinary Services (Egyptian General Organization of Veterinary Services - GOVS) are extremely well represented in the territory, up to the village level and they employ about 27,000 veterinarians. The GOVS officially provide all the state-run animal health control and, on an assisted basis, the basic veterinary services, such as vaccination and treatment of poultry. The services are mainly provided by the "Veterinary Clinics", a structure at village level which covers a few neighbouring villages. Everyone can take their animals to the clinics and receive treatment, several vaccinations and advice for a symbolic price. If other medication is requested, a prescription will be provided and the medication can be bought in a veterinary pharmacy. The Veterinary Clinics organise regularly the so-called "Vaccination Days" for poultry during which the veterinarians move from village to village vaccinating the poultry. Generally the villages are informed the day before and during the vaccination day everyone can bring their birds for a few basic vaccinations such as ND, Gumboro and now also AI.

Unfortunately, not all of these services are regularly implemented and, according to the people in the villages, although contacts with Veterinary Services are considered generally good, they are very limited or not present. Many factors influence this situation: (I) The GOVS structure (with overlapping of activity and responsibility at national, governorate, and district levels) can interfere with the time and efforts of personnel; (II) The lack of financial

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<sup>6</sup> Source [www.undp.org.eg](http://www.undp.org.eg)

and material resources; (III) Strong social control and obligations of people that, for example, may hinder the even-handed implementation of laws (turning a blind eye); (IV) The training level of staff; (V) Low wages that do not adequately motivate staff and encourage people to look for other means of income; (VI) The centralisation of services, such as the laboratories; (VII) A lack of knowledge of the rights of the final user; (VIII) Corruption. Because of all these factors, the quality of service provided is extremely irregular and depends on the helpfulness of single persons rather than on the efficacy and efficiency of the structure.

Another problem encountered during the AI crisis was the policy for stamping out, because the veterinary regulation was applied differently in different zones and not all the "interpretations" were suitable for a proper control of the disease. Moreover, sometimes this interpretation brought along an unjustified culling of birds and in many villages, the local authorities just asked everybody to cull birds in a preventive way. Also the policy of reimbursement for culled birds was unsatisfactory. Only a part of commercial producers received compensation and nearly none of the owners of backyard flocks were reimbursed. Moreover the compensation price (5 EGP / bird) was the same for all categories of birds without consideration of different market prices. The principal implication of these problems is that in an eventual need of culling in the future, we can expect less collaboration from the breeders.

The private veterinary profession is also well represented and provides assistance to virtually all commercial poultry producers. On the other hand, no para-veterinarians are recognized by or active in the private sector. The only comparable parties we identified were non-technical personnel of the public veterinary services that have been empirically trained to assist during vaccination campaigns. Private veterinarians generally work on a full time basis. However, many veterinarians working in the public veterinary services, at universities or in laboratories, often work additionally in the private sector. Almost all private veterinarians are linked with a veterinary pharmacy or they act as veterinary drug retailers.

Pharmaceutical supply is well organised. Veterinary pharmacies are quite widespread and, as far as we have seen, they dispose of appropriate facilities for storage and cold-chain. They offer a large range of products of different brands and even in many villages it is relatively easy to find the principal poultry drugs. Suppliers and distributors of pharmaceutical veterinary products are represented by more than a dozen companies. They can be either national companies importing from foreign countries or Egyptian branches of international companies. They generally operate with independent agents based in different governorates who can sell either to pharmacies, veterinarians or farmers (with different prices). These agents are often one of the most important sources of technical information for farmers. Speaking with these agents, it emerged that the procedures for importing veterinary drugs are generally quite simple, with the exception of vaccines which are also taxed at a higher tax rate (about 25%). We have to remember that the Egyptian national production of pharmaceuticals is mainly limited to vaccines and covers only a small part of the national need. This gives origin to a supply problem, with a shortage of all poultry vaccines on the market and several months of waiting before orders are received. Considering vaccines there is another problem: the smallest available packing contains 1,000 doses, which is cheaper, but not appropriate for backyard flocks.

#### 2.1.4. Other poultry sector linked facilities

Laboratories are present at regional levels, but the analyses they can execute are quite basic. For example, diagnosis of Influenza A virus is only performed in the Central Laboratory for veterinary quality control on poultry production in Cairo (CLQP). At present the CLQP is evaluating the possibility of decentralising this service to five other laboratories all over the country.

There are different extension and training institutions related to the Ministry of Agriculture and Land Reclamation (MALR). In particular there is a training centre related to the agriculture research centre and three training departments related to: (I) animal health research institute, (II) CLQP, (III) GOVS and its local branches. They are well represented in all the governorates and are responsible for training of veterinarians and breeders.

Poultry slaughterhouses are irregularly distributed around the country and they can handle only about 30% of the internal production. Additionally, they are generally only adapted to slaughter improved breeds, not the smaller local ones. During the AI crisis, the national authorities imposed a ban of a few weeks on all live poultry markets and announced the gradual and definitive closure of these markets in the next few years. This measure revealed the insufficiency of abattoir capacity and was one of the reasons for shortage of poultry on the market and the rise in prices of poultry meat. Currently local authorities are planning to build additional slaughterhouses to be prepared for the closing down of all the live bird markets. For example, in the Fayoum Governorate there is only a semi-mechanised slaughterhouse and the local authorities are planning to build two new fully-mechanised ones. The problem is, however, that the already existing one is not in use because people prefer to buy live birds. Moreover, a fully-mechanised slaughterhouse has some incompatibility with the Muslim rules of slaughtering. Before starting with these infrastructural developments, it would be wise to evaluate if closure of the live poultry markets is a reasonable action, since there are implications for unused infrastructures and unapplied laws.

Linked with the shortage of slaughterhouses is also a shortage of deep-freeze storage facilities. The principal consequence is the incapacity of these structures to secure a constant supply in poultry meat to the market. This is one of the reasons for the inconsistency in the price of poultry products, as we will explain in the next paragraph.

One of the main characteristics of the market for poultry products in Egypt is the great fluctuation of the price in an extreme short period, in particular for live birds and meat. We can find one of the reasons of this fluctuation in the "Poultry Borsa", a sort of poultry Stock Exchange. Here, the prices of different poultry products are quoted daily and all the stakeholders in the market chain are more or less obliged to follow this quotation. We have talked with many different persons and, although all those interviewed disliked the "Poultry Borsa" (except one working for a big poultry company), they were hesitant to speak about it. The recurrent affirmations were that "the Poultry Borsa does not work on a demand and supply base". "It is linked with the major poultry companies". "It is directed by only a few people and therefore it is easy to manipulate". Apart from other considerations, the final result of this strong fluctuation in prices is that, for many producers, the poultry rearing became a gamble and, this total uncertainty for a minimal profit hampers any incentive of investing in improved production.

There are no institutions for giving rural credit that work with small producers and only the bigger producers have access to credits through the formal banking system. The financial support for the activities of backyard and small producers is almost exclusively insured by auto-funding and small credits given by dealers of zootechnical products.

Non Governmental Organisations (NGOs) are present, recognised and regulated by law. We encountered one NGO doing poultry restocking at village level.

Agricultural Co-operatives are equally present and regulated by law. These co-operatives can provide technical support as well as facilitate the access to credit and zootechnical inputs. Nevertheless, none of the interviewed small farmers were a member of a co-operative and many had no knowledge of the co-operatives. We were told, that all the services are addressing mainly big farmers.

The poultry sector is not restricted to the categories described above. In spite of all the different trends and problems there are many other small associated activities in the society which represent an important economical value and a source of income for many families: poultry shop owners, plucking and gutting workers, collectors and transportation workers, street vendors in weekly markets, cage makers, mill and small feed producers and feed retailers.

#### 2.1.5. Characterisation of the Egyptian poultry sector

For analytical purposes the FAO has divided the poultry chain in four sectors. In accord with the interviewed representatives of the Egyptian Veterinary Services, we can roughly divide the poultry production system as follows.

**Sector 1. Industrial Integrated System.** This is the top of the chain, with large highly technological farms. They sell their products nationally as well as internationally and import breeding material, feed, expertise and other inputs. They may keep breeding stock, broilers or layers. In Egypt they rear more than 20,000 chickens per cycle and can be differentiated in two well-distinct sub-sectors, that we will call Enterprises and Farms.

**Enterprises:** There are five major enterprises established in a desert area of the Giza Governorate, far away from any other human activity. They carry out the entire production, from grandparents down to the final product for the market (meat, table eggs, fertilised eggs, DOC). They only keep exotic breeds. Apart from these five, other enterprises with hundreds of thousands of birds are established in other desert zones. Generally they rear only one specific product.

**Farms:** All over the populated regions of Egypt we can find farms with more than 20,000 animals with a relatively standardized management. These farms have specific buildings to keep the animals and more or less skilled workers. As a rule, they have a poor bio-security program, external veterinary services and poor mechanisation. Moreover, a major difference to the enterprises is, that they can breed both exotic and local (Ballady) flocks and that they cover only a segment of the market production chain. Usually they don't exceed the 50,000 birds per cycle.

**Sector 2. Commercial Production System.** This production system may produce broilers, layers or Day Old Chicks (DOC). The products are sold commercially in urban and rural areas. These farms keep their birds indoors continuously. In Egypt they rear between 5,000 and 20,000 chickens per cycle. Very similar to the farms described above, however, commercial production systems are smaller in scale and have lower management. It is estimated that in Egypt, around 74% of the broilers are produced on farms of less than 15,000 birds per cycle<sup>7</sup>.

**Sector 3. Small-scale Commercial Production System.** This production system has many similarities to sector 2, but the units are smaller. Poultry may be kept inside a village house. The products are sold on live markets or commercially in urban and rural areas. In Egypt they rear between 500 and 5,000 birds. It is the link between sector 4 and 2 and it is also possible to find many production systems representing a combination of the two.

**Sector 4. The Village or Backyard System.** This poultry production system is characterized by a mix of species and age categories, with a limited number of animals. Veterinary care and input are limited. This is the most widespread and is found in peri-urban and urban

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<sup>7</sup> FA. Hosny. The Structure and Importance of the Commercial and Village Based Poultry Systems in Egypt. 2006.

areas. Many of the households belong to the poorest in the country. In Egypt they rear less than 500 birds. These systems are generally home-run breeding of a few birds, mixing species and ages, often with an "accessory" flock of a few dozen birds of the same age.

These are the principal parameters that differentiate the four sectors, with differences from country to country, in particular regarding the scale of production. Nevertheless, in Egypt, the above classification does not match well with the reality. Indeed the Egyptian poultry sector appears to be a combination of a very developed traditional system and of a modern farming system. For this reason, the following report does not follow the FAO poultry sector division. Instead, we have tried to find a way which is more in correlation with production practices, paying particular attention to the small-scale poultry production units.

One possible classification of the Egyptian poultry production systems would be to differentiate between "traditional" breeding practices and "modern" ones. The two main disadvantages would be that in many points of the production chain they are strictly linked and, moreover, both traditional and modern can range from FAO sector 1 to 4 (at least for several product categories, e.g. traditional hatcheries).

Another possibility is to classify the poultry production systems as "backyard" and "farm" sectors. Where "backyard" is a mixture of rearing practices mainly included in the FAO sector 4 and partly sector 3, while "farm" identifies a rather well-standardized rearing method represented by the FAO sectors 3, 2 and partially 1. We can also consider that virtually all the farms are managed by men and all the backyards by women. We chose this division because it recognizes different management practices and, at the same time, different scales of production.

## **2.2. The Egyptian Farm poultry sector**

The vast majority of the nearly 30,000 Egyptian poultry farms are devoted to chickens and between them almost 90% rear broilers. Although in smaller numbers, there are also turkey and duck farms. In the first section we will refer mainly to chicken farms and in the second part we will highlight the main differences with other poultry production and traditional farms. Other birds, mainly pigeons and geese, are almost exclusively reared in the backyard sector.

In this chapter we will refer to farms rearing less than 5 thousand birds as "small farms", to farms rearing in between 5 and 20 thousand birds as "medium farms", and to farms rearing more than 20 thousand birds as "large farms". Between small and large farms increasing management, mechanisation, technical input and bio-security practices are clearly noticeable. This is not the case in all farms, however, and depends more on the person than on the size of the farm.

### **2.2.1. Farm sector description**

Two features characterise the farm sector: the extreme specialization of the entire production chain and the modularity of the production units.

- Specialization of the production chain. As a rule, each farmer is specialised in only one of the following types of production: parent breeding for the production of fertilized eggs, DOC production, production of 2-3 weeks old chicks, layer breeding up to the age of production, productive layer and broiler rearing. In the case of big farmers with more than one farm with different productions, it is usual that, for example, he produces the fertilized eggs, relies on someone else for the hatching of the DOC, and later again rears the broilers. The final aim of this production chain is to sell eggs and meat on the market, with a few distinctions that we will see in the next section.

- Modularity of the production units around a flock of 5,000 birds. This modularity is also physical. If you see a farm of only 1 storey, very often you can be sure that it accommodates 5,000 chickens; with 2 storeys it will accommodate 10,000, and so on. This modularity is surely one of the heritages of the GPC, who proposed this successful unit. It is also probably linked with the fragmentation of the production chain. The standardisation of the production size can facilitate the trade between specialised producers. This modularity is obviously not present in the small farms, but small farms, as we have observed, are often recently created and are increasing the number of reared birds with each cycle. They are a temporary step in an attempt to become a medium size farm.



**Poultry farm of 5 and 20 thousand birds respectively**

Labour is cheap<sup>8</sup> and in the farm mechanisation is reduced to only the essential. Generally it is possible to find an electrical pump, when the water source is underground, or a mill, if the feed will be home made.



**Poor mechanisation**

<sup>8</sup> A worker in a poultry farm generally earns in between 300 to 450 EGP a month (40-60 EUR).



All farms have a specific building for rearing of the birds. The shelters are made of concrete, with the roof either of concrete, wood, reeds or corrugated iron. On the roof there are often superposed stalks of rice in order to reduce direct heat from the sun.

The location of the building is one of the main differences between farms of different sizes. Medium and large farms are located in the countryside, while small farms are within the village perimeters<sup>9</sup>. Furthermore, although small farms have a specific building to rear birds, often these buildings are not built for this purpose. Usually they are buildings still under construction and, waiting for their final and official use, that are temporarily used as poultry shelter<sup>10</sup>. Nevertheless also in rural areas, with specially constructed farm buildings, it is common to find farm clusters, with many farms close one to another. The existing legislation concerning the minimal distance between farms is completely ignored<sup>11</sup>.



**Flat in a village temporarily used as farm for 1.500 broilers**

<sup>9</sup> Egyptian villages are very concentrated and it is unusual to see isolated habitations in the countryside.

<sup>10</sup> We have spoken with a farmer forced to close the activity during the AI outbreak. He was restoring the former hen house for his marriage.

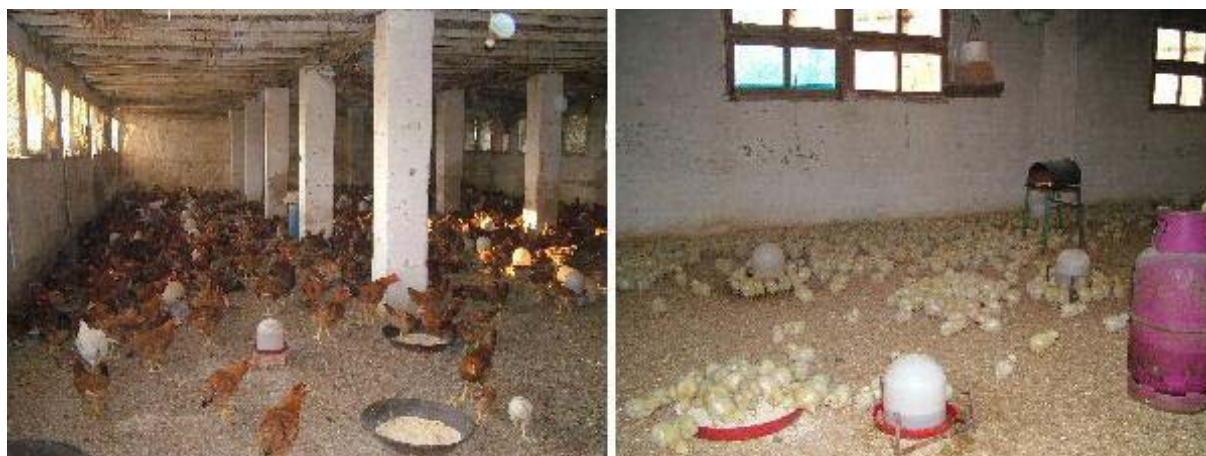
<sup>11</sup> According to the law, any poultry farm must be away from the nearest civil house and / or other poultry farms by the following distances: Broiler & Hatchery 1 km; Layer & Parent 2 km; Grand parent 15 km.

All chicken farms implement only confined breeding and birds are strictly separated by species, age and by type of production. Ventilation and lighting are mainly natural by windows. During the night artificial lighting is used and this seems to be suitable. Indeed it is possible to recognise from outside the production type: in layer farms the light is stronger than in the broiler farms. Sometimes a ventilator is used, but this is far from being a closed ventilation system. Climate control is difficult to evaluate, but with the roof insulation and the good natural ventilation in summer, and the artificial gas heating in winter, it seems to be adequate.

Sawdust or straw are generally used for litter.

Window grids are generally present, but most of the time they are damaged and it is not unusual to see other birds inside the building. Contact with other animals is limited to rodents, which seem to be the major pests.

All farms rely on tap or underground water. Given the intensive agriculture and the proximity of the water table in many zones (6-10 m), chemical pollution is possible at farms with an underground water supply. Water delivery, most often, is done manually with bell drinkers and spilling of water may be a source of gastrointestinal pathologies.



### Breeding conditions

Feeding is also often done manually and distribution is done by feeders hanging from the ceiling. The few mechanised feeders we have seen were not working. Here the spillage is more an economical loss than a source of pathology and the question may arise about the quality of the feed. Almost all farmers rely on locally prepared feed and only few use pellets or industrial feed (easy to find but more expensive). The used formulas of the locally made feed are quite standard, but the final nutritional value can vary greatly depending on the quality of the different components, and incorrect conservation can be a source of pathogens. In absence of laboratory analysis data, indirect observation can give an idea of the nutritional value and microbiological pollution. For the observed cases, the food conversion ranged between 2.1-2.5 kg feed for 1 kg live product<sup>12</sup>. The food conversion was better for the only interviewed farmer using industrial feed (1.8 kg feed for 1 kg product). The period of broiler rearing ranged between 37 to 45 days<sup>13</sup>. Observed conservation of prepared feed and components, both in shops and farms, seems to be satisfactory. All is stored in shelters in closed sacks, without leaks or evidence of rodents. If necessary the hygienic

<sup>12</sup> It is impressive how all the interviewed farmers know exactly how many kilograms of feed they use to reach the marketing weight.

<sup>13</sup> Often the farmers wait a few days more or less in order to get a better price in the highly variable market.

conditions of the storages may be improved. Consequently, the quality of feed may possibly be improved, but it seems to be rather balanced and not a critical source of pathogens. Vitamins are also given regularly.

All farmers rely upon veterinary advice and service and all have scheduled prophylactic plans. The plans may vary from farm to farm, depending on the advice and the local sanitary situation. In spite of that, Newcastle Disease and Gumboro vaccinations are always implemented. Other vaccines against Marek's Disease, Fowl Cholera and Infectious Bronchitis are also often used, as well as antibiotics and anticoccidial as prophylactic treatments. Therapeutic treatments are used if necessary, usually following veterinary advice<sup>14</sup>.

In case of the presence of sick birds they are immediately removed from the flock and placed in a provided space. Unfortunately, this quarantine space is often simply a space in the breeding room separated by a wall, or worse, by a grid or cloth. Therefore, contacts between healthy and sick birds are possible and when a worker leaves the quarantine space he has to go through the breeding room.

The "All in - All out" policy is a rule and, at the end of a cycle of production, all animals are sold in the same short period to one or more collectors. During the sanitary gap, the building is cleaned and disinfected. Generally the sanitary gap lasts two weeks or so, but in several cases only three-four days. As far as we have observed, the farmers never sell directly to the market but always through middleman, therefore, the "Live in - Dead out" policy does not pose any problem.

The general hygienic conditions, as we observed, are variable, but generally not excellent. The breeding rooms present dust and spider webs on walls and ceilings. The store and yard are usually very unclean. The perimeter outside the farm very often resembles a waste disposal site. Internal disinfections, out of the sanitary gap, are executed occasionally and unprepared. In one case, a farmer affirmed to also disinfect around the farm, however, having seen the conditions of the site, the job had been worthless.



**Yard of a 20.000 parents farm**



**Quarantine in a 5.000 broiler farm**

Each farm employs permanent workers, at least during a full production cycle. Nevertheless the wives of these workers often rear birds at home and even the owners often have other birds at home, particularly owners of small farms.

<sup>14</sup>In Egypt it is possible to buy in the pharmacy any human and animal drug without medical prescription.

Theoretically visitors are not allowed to enter the farms, but every time we asked to see the breeding conditions the doors were opened. Moreover, for some jobs, daily workers are employed and, when a farmer has a problem, he asks his neighbour for help.

Other means to avoid introduction of pathogens, such as changing of clothes and shoes, disinfection of clothes, workers showering before entering, and washing hands before and after handling birds, are not applied. Only once we saw a washbasin for shoes with disinfectant near the entrance of the rearing room and one other time we saw an empty concrete basin which had been used during the AI crisis. Only occasionally rules such as "first work in clean then in the dirty area" are implemented, but anyway, clean and dirty areas are generally not separated.

Cleaning and disinfecting working materials is done more or less regularly. All farmers have their own materials and they do not share equipment. Only the cages of the collectors may be shared, but generally they do not enter in the breeding room and, in any case, they are used only at the end of the cycle. Moreover, according to the collectors, after the AI outbreak many farmers started to disinfect the lorry before entering in the farm.

It is normal practice to throw the carcasses of dead birds into the street or into the fields for dogs and cats, or in the nearby canal. Currently, however, after the panic generated by the AI outbreak, in many cases people bury the dead birds or, most often, put them in a plastic bag and throw them in the household waste. The problem is that the household waste in many villages is disposed somewhere in a corner and is emptied only once a week, so dogs and cats still have access. We have even seen dead chickens floating in a canal. The litter from the breeding rooms is sold most often as a fertilizer for the desert lands, sometimes also as feed for fish farms. No farmers implement any form of compostage.

### 2.2.2. Other poultry production and traditional farming features

We will describe here two different farming systems: Duck and Turkey farms and traditional hatcheries.

With duck and turkey farms the modularity of the production units and the division of the production chain is not constant. Besides the large broiler farms that rear improved breeds and that we can compare to the previous section, other farms rear indigenous breeds in an integrated way, with parent, hatcheries and broilers in the same compound.



**Turkeys farm**

The main difference in management and bio-security is that the "All in - All out" policy is not always respected for parents and never respected if we consider the whole farm. With duck production, it is also possible to find semi-confined systems, with fenced spaces and ponds for the day. Another important difference with the chicken farm sector is the target group

where the final product is sold. Fertilised eggs, DOC and 1-month old chicks are mainly produced for the backyard breeding whilst broilers are for the market.

### Box 1: Traditional hatcheries

These are built as a central corridor, with openings on the two sides, giving access to small lateral chambers without external openings. These openings, big enough to allow the passage of a man, are built on two or three levels, for a variable number of rows, depending on the length of the corridor.



In each chamber lay a few thousand eggs (see photo on the cover). The total capacity of a hatchery varies from several thousand to more than 100 thousand chicken eggs, or less for duck eggs.

The eggs are manually turned and are incubated only by means of petrol lamps, both for heating the air and water container, to keep a high humidity level. The entire process is completed without any technical aids such as a thermometer or hygrometer. All is based on the experience of the workers. The hatching percentage ranges between 71 to 80 %. In the hatchery the eggs are also candled and, on request of the buyer, the DOC vaccinated.



There is a sector of production, the traditional hatcheries, that doesn't fit into any of the earlier classifications, and that is the connection between backyard and farm production and between traditional and modern.

A traditional hatchery is a place where fertilised eggs coming from both small and large farms are incubated to produce DOCs destined to both farm and backyard production. They normally incubate only local breeds of chickens and ducks. They do not implement the "All in - All out" policy and the production is only interrupted once a year for repair jobs (for more details see Box 1).

Linked with traditional hatcheries are other producers that buy the DOC and rear the chicks for only a few weeks, before selling them to the backyard sector, door to door in the villages, and on weekly markets in the cities.

### 2.3. Egyptian Backyard poultry sector

The household poultry production is generally understood as a limited number of birds of different ages and species scavenging around the house. In Egypt, realistically we should add two other categories to the poultry household production:

- The first category is similar to the one described above, but with strictly confined birds;
- The second, a confined flock of dozens of birds of the same age and breed.

These categories often coexist in the same household and also often in the same space. These traditional ways of rearing depend on simple, non-mechanized techniques, they have women as owners and decision maker, and they have no consistency in the time. The number and frequency of animals reared depend on factors such as accessibility to money or credits, ease in finding DOC<sup>15</sup>, availability of space, other occupations of the owner, etc.

For simplicity in this document, we will use the term backyard for all the varieties of household rearing methods, even though backyard most probably is not the best suited label for this way of farming, mainly because this reminds us of scavenging birds, absence of input and an integrated breeding, which are not a general rule.



#### Scavenging birds

Before the AI outbreak in February 2006, virtually all women in rural areas without other occupations were rearing birds at home. In urban areas poultry rearing was less of a rule, but equally common. After the AI outbreak different factors contributed to a considerable

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<sup>15</sup>DOC availability is temporarily a problem due to the shortage in the entire poultry production chain.

reduction in household poultry breeding: the massive bird destruction, either by culling or eating, the administrative restrictions, and the fear of the disease itself.

When speaking with people at present, it is possible to sense a higher awareness about good rearing practices and already several of the old habits seem to have partially changed. In particular, compared to a few months ago, the presence of scavenging birds in the streets of the villages is to some extent reduced. At the end of an interview, when we asked to see the birds, we were always taken to see the birds on a roof, in a room or in the backyard, but never on the street. This change, and others that we will mention later, was essentially generated by the big collective panic. It is possible, however, that with time the fear for personal health will decrease and old habits will return. Nevertheless, birds are still often present in rural households and, where there are no birds, there are plans to restock.

We have to stress that our investigation may be biased. The first reason might be a misinterpretation, concerning management practices, because matters such as housing, input, health, etc. can vary substantially between scavenging and confined birds. The second misinterpretation concerns the rearing aim, as it is likely that the poorest people are late to restock. We have tried to overcome this bias by interviewing a number of ex-backyard breeders. The following describes the current situation.

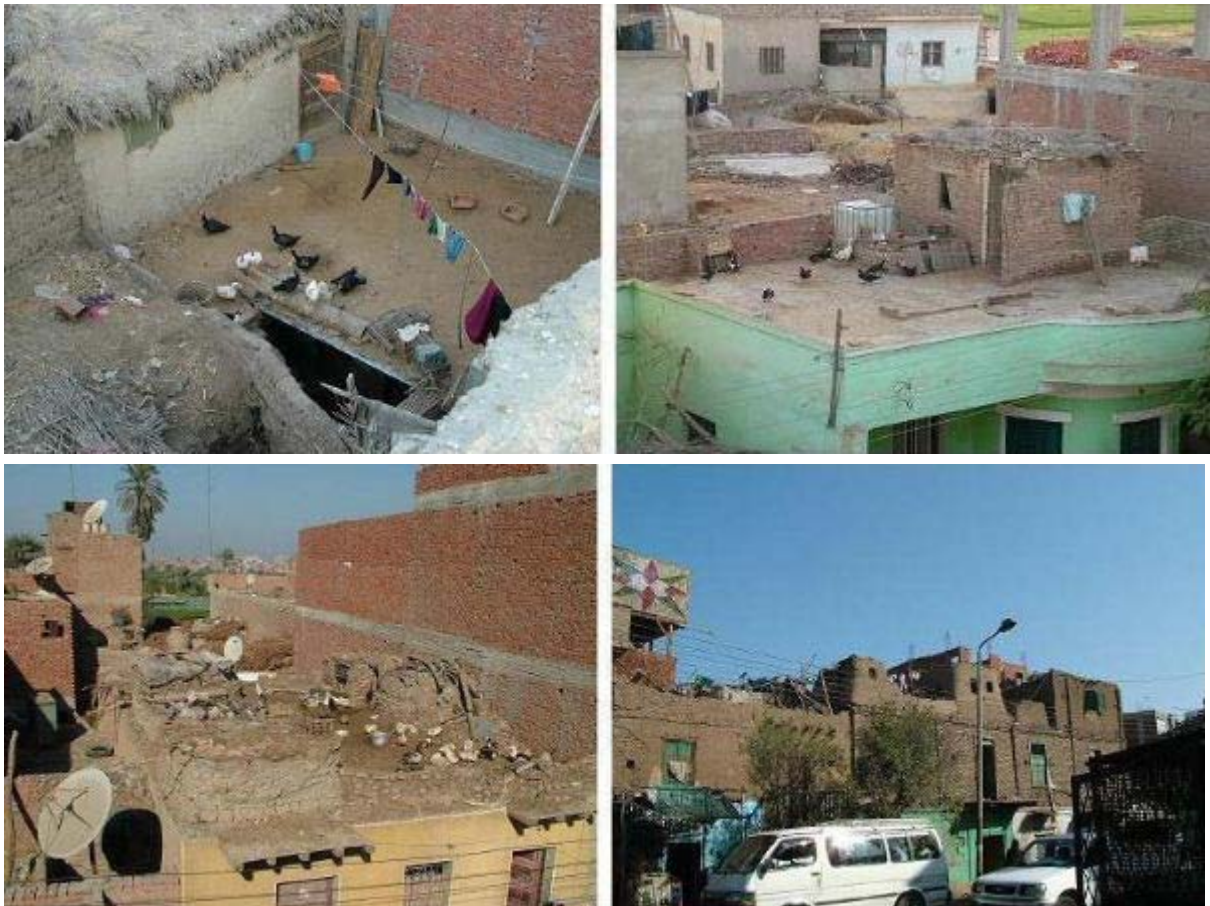
### 2.3.1. Backyard sector description

There are five main species of birds reared. In descending order of importance these are: chickens, ducks, pigeons, geese and turkeys. The central basis of the backyard system is a flock composed of birds of different ages and species of indigenous breeds, either free-ranging or confined. In addition to the central flock, there are often "accessory" flocks of chickens of the same age and species, either of indigenous or selected breeds. These "accessory" flocks are usually confined and separated from the central one, especially when the birds are young, to avoid losses caused by fights. Sometimes a few of these birds will become part of the central flock, but they are mainly destined to auto-consumption and less important for sale. Self production of birds is common. However, it is much easier to find "accessory" flocks than hens with a brood of chicks. Possibly this is a temporary situation due to the actual restocking phase, however, it does give the strong impression that also the backyard sector has a traditional component of intensification of production.

The weekly markets are the main source of chicks for breeding for many urban families. Here you can easily find hundreds of chicks from 1 day to 3 weeks old of indigenous breeds as well as selected breeds. The retailers are most often ordinary people who buy DOCs in hatcheries and resell the chicks immediately or after a few weeks of rearing. In a few cases we encountered people who buy fertilized eggs and hatch them at home with small electric incubators. In rural areas, except for the weekly markets, it is also normal to find retailers going from door to door with a cage of chicks. Recently their numbers have reduced because of the restrictions on transporting poultry from one zone to another. They are still present, albeit illegal. The category of breeders for 3-weeks old chicks presents another characteristic. Often these are run by men and they are one of the few backyard breeding categories that are mainly devoted to commercialisation.

Another characteristic of the Egyptian backyard sector is unquestionably that any free space in a house can contain poultry. The most common is the use of the traditional flat roofs, but also rooms in houses, balconies, basements, unfinished buildings, backyards and, of course, the streets can provide space for this purpose. This is not only the case for the poorest class, but also for the middle class without having an immediate financial goal. It is simply a tradition to rear birds and to see the source of food alive. For this last reason also live bird markets are largely preferred to slaughtered birds.

At present flocks are, in the majority of cases, confined and the free-ranging birds are mainly ducks, geese and pigeons, due to the particular habits of these animals. As a rule shelters are present and also scavenging birds are confined at night. The shelters most often are unfinished rooms or small houses of clay bricks built for the purpose. The main function of the shelters is to prevent escape, whilst predators and bad weather do not seem to be a major problem. If escape can be prevented by other means (rooftop breeding, fences, cages) the shelter may be just a simple roof. Lighting, ventilation and temperature are completely natural. Even though it is easy to find pigeons in the same compound as the other birds, they often have a special loft. In urban areas these pigeon lofts are mainly wooden cages on the roof, with characteristic geometrical drawings. In rural areas they are often represented by traditional earthen towers. Although the total number of household flocks has decreased considerably since the beginning of the AI crisis, it is impressive to see, just by climbing on a higher roof or even by looking up from the street level, how many rooftop breeding is still ongoing.



### **Rooftop breeding**

The main predator is the cat (once also mustelids were mentioned). Surprisingly, even after explicit questioning, birds of prey, although present, were not recognised as a problem, neither for rooftop breeding.

Including confined flocks, species are generally not separated and, even when separation is implemented it is not effective due to the risk of the birds of escaping and because staff and materials circulate in the area without restriction. Rabbits are also frequently reared in the same space as the birds and sometimes even small ruminants. Window grilles, fenced ponds and others means of avoiding contact with other animals are clearly inadequate in these systems.



Feeding and watering take place in the same yard or room where the animals are confined, and also free-ranging birds normally receive a feed complementation at home. Generally a bowl, a tray or a simple half plastic tank is used. The consequence is a substantial food loss, water spilling as well as contamination by animals walking and defecating in the food. Moreover, no proper litter is used and often the ground is covered with manure, residues of food and of other human activities. Interviewed persons claim to clean the soil, but this is clearly not a daily activity. The hygienic conditions seem to be often, though not always, very poor. In spite

**Backyard breeding** of this, pests as rodents, insects or parasites are generally not named as a major problem. For flocks of one age and species, it is possible to find proper feeders and bell drinkers.



### Pigeon shelters

Tap water is the nearly exclusively used source for watering, which is available in the large majority of villages. Birds receive a homemade feed prepared by mixing corn and soya bean meal, residues from the kitchen and often alfalfa or other grass. A few people occasionally add fish-meal and/or vitamins. All these products are readily available either in generic or specialised shops, in veterinary pharmacies or in the markets. It is difficult to comment on the quality of the feed but without doubt the nutritional value is very variable and probably in general inferior to the one seen in the farm sector. Microbiological contamination of the feed and integrator is comparable with that of the farm sector. The hygienic status of locally produced grass is likely to be different. Irrigation is mainly done with superficial water which can be an important carrier of many pathogens, given the hygienic conditions of the canals due to the habit of using them for waste disposal and also for dead birds.

Disinfection of yard or shelter is not at all a common practice but sometimes an insecticide is used. This is generally used in the same space where the animals live and, depending on the drug used, could be a source of poisoning.



**Mix of species**

Vaccinations are frequently used but without consistency or any systematic prophylactic plan. Often DOCs are vaccinated at the source with one or two vaccines. Newcastle Disease, Marek's disease and recently AI are the principal ones. For adult birds the type and frequency of vaccinations is much more irregular. Vaccinations are sometime disliked. In one case we were interviewing a farmer with birds at home. Despite knowing the importance and having the opportunity to vaccinate his backyard flock, he refuses to do so because, he claims that vaccines give the meat a bad taste. Other prophylactic treatments are essentially not utilized. Instead, therapeutic treatments may be given in case of necessity, but also in these circumstances only if veterinary facilities are available nearby. Most often sick birds were slaughtered and eaten. On the other hand, dead birds were thrown away. After the AI outbreak this habit seems to have changed. Now sick birds are slaughtered or left to die and then disposed off.



**Litter composition**

All general sanitary practices to avoid direct and indirect contact with other flocks are simply not applied. New birds are most often introduced into the flock as chicks or through buying fertilised eggs while introducing adult animals is not a common practice. No quarantine is employed when new birds reach the flock. Generally only few persons within the household look after the birds, but there are no restrictions for other people to visit the flock. Similarly, although there is no real sharing of breeding material, the yard and the shelter where birds are confined are often used as a store and these materials do not have any restriction with regard to circulation and, even when required no disinfections are done. In these cases, we

put aside the idea of mentioning other sanitary practices such as change and disinfection of clothing and shoes, workers showering before entering, washing of hands after handling animals, first work in clean then in dirty areas, "all in - all out", sanitary gap, and "live in - dead out".

Similar to the farm sector the disposal of dead birds is unacceptable. The disposal of manure is normally done by just throwing it into the streets or by using it as fertilizer in the family fields.

### 3. Bio-security limitations of the Egyptian poultry sector

The Table 2 presents a review of the implementation of the principal bio-security practices that were discussed before. It is evident that the general breeding conditions are poor, particularly in the backyard sector.

**Table 2:** Review of the implementation of bio-security practices

	Farm	Backyard		Farm	Backyard
Mechanisation	-	--	Quarantine for new birds		--
Enclosure preventing escape	++	++ / --	Quarantine for sick birds	--	--
Shelter	++	-	All in - all out	++	--
Distance in between farms	--	--	Sanitary gap	+	--
Natural lighting	++	+	Disinfections in between cycles	+	
Artificial lighting	++		Live in - dead out	++	--
Natural ventilation	++	+	Internal hygienic conditions	-	--
Artificial ventilation	--		Internal disinfections	-	--
Temperature	+	+	Storage hygienic conditions	--	
Litter composition	++	--	External hygienic conditions	--	--
Window grilles	--	--	External disinfections	--	--
Separation of bird species	++	--	Permanent workers	+	
Separation of ages	++	-	Workers' contact with other flocks	--	--
Contact with wild birds	--	--	Presence of visitors	-	--
Contact with other animals	+	--	Change of clothes and shoes	--	--
Presence of pests	-	-	Disinfections of clothes and shoes	--	--
Fenced pond		--	Workers shower before entering	--	--
Indoor feeding	++	-	Cleaning of working material	-	--
Water quality	++	+	Disinfections of working material	-	--
Water delivery	+	--	Wash hands before/after handling	--	--
Water spilling	-	--	Use of shared equipment	++	--
Food quality	+	-	Disinfections of shared equipment		--
Food delivery	+	--	Collectors entrance / disinfections	+	
Prophylactic treatments	+	-	First work in clean then dirty area	-	--
Therapeutic treatments	+	-	Carcass disposal	--	--
Veterinary care	+	-	Litter disposal	-	--
Sick / dead birds removal	++	+			

#### 3.1. Farm sector

To facilitate the analysis and, where possible, to find a solution for improving bio-security in the farm sector, we need to simplify Table 2. A first simplification can be done by separating all parameters which, as a whole, are poorly implemented (see Table 3) from those which are sufficiently well implemented (see Table 4). This is done except for the prophylactic treatments, because the vaccination against HPAI deserves special attention.

Speaking from a bio-security point-of-view, we can differentiate two major types of disease, the so-called "production-limiting diseases" (such as many respiratory diseases and enteritis) and the "epidemic diseases" (such as ND and AI). The "production-limiting diseases" are

mainly a problem of the individual breeder. These are often caused by poor management and can be controlled essentially by constant efforts at the individual level. The "epidemic diseases", on the other hand, are a problem of the whole sector and, the whole sector has to improve and harmonise several animal husbandry practices for a valid solution. Nevertheless, "epidemic diseases" can also be controlled at the individual level with vaccination.

This can cause other problems because vaccination allows the farmer to be less strict on many other aspects. If we compare Tables 3 and 4, we can observe that the majority of the bio-security issues that are poorly implemented (Table 3) are those practices that are intended to reduce the introduction of pathogens to the farm (marked with \*), where a vaccination can mask the problem. In contrast, the largest part of the bio-security issues sufficiently well implemented (Table 4) are zootechnical and sanitary practices (marked with #) where a constant effort is essential.

**Table 3: Bio-security practices poorly implemented within the Egyptian farm sector**

Mechanisation	External disinfections *
Distance in between farms *	Workers' contact with other flocks *
Artificial ventilation #	Presence of visitors *
Window grilles *	Change of clothes and shoes *
Contact with wild birds *	Disinfections of clothes and shoes *
Presence of pests *	Workers shower before entering *
Water spilling #	Wash hands before & after handling *
HPAI-vaccination	Cleaning of working material #
Quarantine for sick birds #	Disinfections of working material #
Internal hygienic conditions #	First work in clean then dirty area #
Internal disinfections #	Carcass disposal
Storage hygienic conditions #	Litter disposal
External hygienic conditions *	

**Table 4: Bio-security practices sufficiently well implemented in the Egyptian farm sector**

Enclosure preventing escape	Food quality #
Shelter #	Food delivery #
Natural lighting #	Prophylactic treatments #
Artificial lighting #	Therapeutic treatments #
Natural ventilation #	Veterinary care #
Temperature #	Sick / dead birds removal #
Litter composition #	All in - all out *
Separation of bird species #	Sanitary gap *
Separation of ages #	Disinfections in between cycles *
Contact with other animals *	Live in - dead out *
Indoor feeding *	Permanent workers
Water quality #	Use of shared equipment *
Water delivery #	Collectors entrance / disinfections *

In other words, it is obvious that the farmers try to reduce efforts and costs of successful poultry breeding and vaccination is therefore, from their point-of-view an excellent tool. However, because of the recent outbreak of HPAI and because vaccination against HPAI presents a major disadvantage, this attitude entail other consequences.

After the AI-crisis, one of the responses of the Veterinary services was widespread vaccination and actually vaccination is now commonly seen as "the solution" of the problem.

While vaccination can be considered as a solution for other diseases, it should be considered more carefully for AI, given the implications for human health. AI vaccines give a good protection against the disease, but also allow persistency of the virus in the environment. This is caused by possible unapparent infections and consequent shedding of the virus.

Therefore, our first emphasis is to improve the poultry husbandry, aiming to prevent the contact between animals and pathogens and to prevent the diffusion of pathogens. Afterwards, to ensure a real implementation, we have to look at simpler means that not only improve bio-security, but also can bring direct advantage to the farmers.

### 3.1.1. Bio-security evaluation in the farm sector

To evaluate the bio-security in the farm sector we can reorganise all the practices that are poorly implemented (Table 3) according to two different patterns.

- To look at the practices with a major bio-security impact on disease-control, namely AI. This highlights the priority where we have to work.
- To look at the main limiting factors for the implementation of different bio-security practices. This highlights the issues that can be expected to be "easier" to work with.

Finally we can combine the two different results to obtain the affordable priority for improving bio-security in the farm sector.

#### Practices with major bio-security impact on disease control.

Table 3 may be divided into four groups. The first group of bio-security practices includes all those linked with the production-limiting diseases seen before, and which we can call "production-limiting managements" (see Table 5). From an AI-bio-security point-of-view, they have a subordinate role.

The second group of bio-security practices are all those that facilitate the circulation and the persistence of pathogens in the farm. They are also mainly a problem of the individual breeder and, from an AI bio-security point-of-view, they are of minor importance. They are listed and summarised in the Table 5 as "pathogen-persistent managements".

**Table 5:** Classification of bio-security practices poorly implemented in the farm sector by **bio-security impact on AI**

Impact	Bio-security practices
Production-limiting managements	- Mechanisation. Artificial ventilation. Water spilling.
Pathogen-persistent managements	- First work in clean then dirty area. Cleaning of working material. Internal & working material disinfections. Quarantine for sick birds.
Introduction of pathogens	+ Presence of visitors. Distance in between farms. Workers' contact with other flocks. Change of clothes and shoes. Workers shower before entering. Disinfections of clothes and shoes. Wash hands before & after handling. Window grilles. Contact with wild birds. Presence of pests. External hygienic conditions & disinfections. Internal & storage hygienic conditions.
Dissemination of pathogens	+ HPAI-vaccination. Carcass & litter disposal.

From an AI-bio-security point-of-view the last two groups are the most important. They include all those actions that facilitate either the introduction of pathogens into the farm or the spread of pathogens in the environment. We can summarise them as "introduction of pathogens" and "dissemination of pathogens", respectively and they are also listed in Table 5. In the group "introduction of pathogens" we also added "internal & storage hygienic conditions" because if we improve this aspect we can also indirectly reduce the presence of pests like rodents, that can act as mechanical vectors.

#### Main limiting factors for the implementation of different bio-security practices

Table 3 may also be divided in a completely different way. We can start with two categories:

- One which determines the main limiting factors regarding social aspects. This aspect includes "distance in between farms" and "workers' contact with other flocks".
- Another with limiting factors in knowledge and economical reasons. Here we include all the other points.

Concerning the distance between farms:

In many areas one can find clusters of poultry farms very close to each other, although respect for the minimum distance is one of the basic parameters for an effective disease control. A law exists but it was not implemented. The reasons may be different, but one of the most important ones are the strong social obligations of people who turn a blind eye when minor laws are broken. Presently, due to the AI-crisis, the Veterinary services can be stricter regarding the authorisation of new farms. The farmers understand not only the sanitary reasons for respecting this minimum distance, but also their own economical interest. This was clear in all the Governorates that we visited.

If there will be a more appropriate distance between the new farms in the future, there will be still the problem of the existing clusters of farms. Interestingly, all the visited Veterinary services had a list of all the poultry farms divided in "authorised" and "not authorised" and with "good" and "bad" bio-security measures. However, on direct questioning people working in the veterinary services, they openly say that they are not "socially allowed" to close any farm, neither the unauthorised ones with bad bio-security measures, because this would harm the farmers economically.

Concerning the workers contact with others flocks:

It is clearly not possible to forbid farm workers to have poultry at home. This not only for practical reasons, but also because most often they belong to the poorest part of the population and a backyard flock is their economical need.

The main practical implication is that any possible solution for these two problems can be suggested at central level, but has to also be implemented according to the local situation. Instead, as the next category will prove, different solutions may be found and implemented starting from central level.

In the category that finds a limiting factor in knowledge and economical reasons, we can again differentiate three groups, depending of the amount of investment required by the farmer for a possible solution (see table 6).

- No investments. It is mainly a matter of a different organisation of work or a change of habits. Sometimes, also some more work is required.
- Small investments. Here we also include "window grilles" and "contact with wild birds", because, in the farm sector, very often the grilles are already present, but damaged, so only repair works are necessary and, because of the strict confinement of poultry, the contact with wild birds is strictly linked with the presence of damaged grilles.
- Significant investments.

Out of the four different groups shown in table 6 we can expect that the one requiring only knowledge and no investment will be the "easiest" to implement correctly, while the most difficult to deal with is the one that requires significant investments. For the other two groups the success to be correctly implemented may vary, especially for the one where the limiting factor is a social aspect.

**Table 6.** Classification of bio-security practices poorly implemented in the farm sector by **limiting factor**.

Limiting factor	Requested investment	Bio-security issues
Social aspect	Variable	Distance between farms. Workers' contact with other flocks.
	No investments, if necessary work	Presence of visitors. First work in clean then dirty area. Carcass & litter disposal. Wash hands before & after handling. Cleaning of working material. Internal & storage hygienic conditions.
Knowledge & economy	Small investments	HPAI-vaccination. Quarantine for sick birds. Disinfections of clothes and shoes. Window grilles. Contact with wild birds.
	Significant investments	Mechanisation. Artificial ventilation. Water spilling. Presence of pests. Change of clothes and shoes. Workers shower before entering. Internal, external & working material disinfections. External hygienic conditions.

Now, if we merge the last two tables (5 & 6) into a new table 7, we will have a general idea of the feasibility and the respective impact of different practices to improve bio-security in the farm sector. It is clear that this is quite theoretic because to solve a problem we also have to consider the uneven individual human response. Nevertheless table 7 can show us the priorities.

**Table 7.** Main practices grouped by their impact on bio-security and the grade of correct implementation in the farm sector

		Impact on AI control	
		Significant	Minor
Grade of correct implementation	Easy	Presence of visitors. Wash hands before & after handling. Carcass & litter disposal. Internal & storage hygienic conditions.	First work in clean then dirty area. Cleaning of working material.
	Variable	Distance in between farms. Workers' contact with other flocks. Disinfections of clothes and shoes. HPAI-vaccination. Window grilles. Contact with wild birds.	Quarantine for sick birds.
	Difficult	Change of clothes and shoes. Workers shower before entering. Presence of pests. External hygienic conditions & disinfections.	Mechanisation. Artificial ventilation. Water spilling. Internal & working material disinfections.

Finally, we can see that some practices in the case "significant / difficult" of table 7 reduce the degree of danger if other issues in the upper cases are properly implemented. For example, not changing shoes and not taking a shower before entering, become less a risk factor if the workers wash their hands and disinfect their shoes. Equally, the presence of pests will be reduced if the general hygienic conditions would be improved.

### 3.1.2. Recommendations to improve bio-security in the farm sector

In the previous chapter we have seen that vaccination allows the farmer to be more relaxed on several bio-security practices, but equally that AI-vaccination has a major disadvantage. We have also seen the relative importance of different practices on the control of AI and the limiting factors for an appropriate implementation of these practices. Besides, several of these practices may be improved with a simple change in the management. Therefore:

- Information and training of farmers must be a priority, in order to increase their awareness and to give them an economical reason for implementing a more bio-secure management. In several cases this has to be preceded by a national choice of policy, so as to harmonise and improve the message to be delivered, to ensure a correct application, and to facilitate the work in the field.
- An improvement of the economical context, at least of the inconsistency of the poultry market price, could greatly help to put into practice the basic bio-security rules.

#### ➤ Information and training of farmers

Two main channels may be used to deliver information. The first is to target a large public with a simple message. We will discuss this in paragraph 3.2.2. The second is a training specifically prepared for farmers.

The content of the training has to include a general explanation as well as the principles on bio-security, and it has to focus on the issues we found in the rows "easy" and "variable" of table 7. This information should be included in order to reduce the quantity of information and to be more practical. The other items may just be pointed out as general information to the farmers. During the training the hazardous activities has to be described and several points has to be stressed.

#### 1 Carcass disposal.

Dead birds are usually thrown in the field for dogs and cats or, worse, thrown in a nearby canal. It has to be clear that this is an unacceptable way of disposal. It is the easiest way to spread many diseases. Everybody knows this and a partial change of this habit has already occurred during the AI-crisis. Now it is important to stabilize and improve this change. During AI-crisis the two principal ways to dispose the dead birds were:

- To burry the carcass.
- To put the carcass in a plastic bag and to throw it in the garbage.

The weak point in this is that, in many villages, the garbage is just an open space, without containers, that is cleared once a week, and where dogs can enter. For this reason, where garbage containers are not available, it is better to bury.

#### 2 Litter disposal.

Litter is sold, normally as fertiliser for desert lands, sometimes to fish farms. To reduce the environmental spread of virus:

- The sales to fish farms have to be discouraged by explaining the risk of environmental pollution, and encouraging selling as fertiliser.
- The best way will be to compost the litter before moving it. Unfortunately, this will demand more work, time and space, without an improvement of the final price. As this is unlikely to be applied, the most pragmatic solution is to reduce loss during the transport.

- A simple canvas on the lorry should be made compulsory. It would be even better if the lorry is airtight.

### 3 Distance in between farms.

At the present moment, any possible solutions have to propose an alternative that does not damage the interest of farmers and that is not expensive for the community. Possible alternatives are:

- To stimulate the conversion of the poultry farm to another production farm, by means of training of farmers and / or fiscal advantages.
- To authorise the transformation of the farm into human habitation (possibly without backyard flocks) or factory building, by means of municipality pronouncement and / or fiscal advantages.
- The co-ordination between cluster farmers of a simultaneous production, i.e. the same "all-in all-out" policy, through meetings and extension. This would be fairly easy to organise because the production of broilers is dominant.
- To explore the possibility to close at least non-operational, unlicensed farms.

All these alternatives need, at first, to be accepted at national level before being suggested to local levels, where they could be proposed to farmers in accordance with the local situation.

### 4 Workers' contact with other flocks.

Different solutions may arise, either from a different working plan or from a deal between workers and owner:

- For the large farms, as already implemented by the poultry enterprises (described in chapter 2.1.5.). Three weeks of work on the farm, without going home, then a period of rest. The working period is also preceded by 3 days of quarantine and disinfections in order to ensure a "clean staff".
- For smaller broiler farms with only few workers. Not returning home during the production period (40 days) and the rest period taken during the empty period.
- For all farms. The worker accepts not to breed poultry at home, and the owner will provide him with a number of chickens at the end of the production cycle (broiler) or during the production (layer).

### 5 HPAI-vaccination.

For the reason explained before:

- The long-term goal has to be the eradication of the virus.
- The short-term goal, in anticipation of the final one, should be a more appropriate vaccination plan, aimed at reducing the spread of the virus as much as possible.

Also here a national choice has to be made before suggesting a proper prophylactic policy.

### 6 Contact with wild birds.

Because all chicken farms implement exclusively confined rearing, the main reason for a contact to the wild birds is defect window grilles.

- Small repair work will solve the problem in many cases.

Concerning the infrastructures, we have to consider that the farmers are not always the owners of the buildings and, consequently, they have little interest in investing in the infrastructure. Also for this reason, during the training, the economical side has to be accentuated. The improved management will reduce the use of other inputs (drugs, poisons) and improve the production (better food conversion, reduction of mortality). Last but not least, a greater stability of the market price may allow the farmers to plan a general management improvement, as we will discuss in the next section "improvement of the economical context".

## 7 Quarantine for sick birds.

Also in this case small changes in the infrastructure are often necessary. There are two options:

- In case of only a few sick birds, it is better to cull them.
- If the farmer does not want to kill the birds or if their number is significant, a completely separate room has to be established.

A simple, clear and affordable technical advice is the starting point for persuading the farmers to improve the management. The existing fear for AI provides an additional opportunity to reach this objective. Furthermore, the veterinary services during their routine work have to follow up the implementation and to take part with constant technical advices.

## ➤ Improvement of the economical context

This is a problem that affects many aspects of the poultry production. We have seen that poultry rearing is a real gamble. It doesn't allow investments to improve the quality and quantity of production because of the unpredictability and broad fluctuation of prices of poultry products during a short period.

On request of the FAO, this mission was focused on the bio-security of small-scale producers. The poultry market was only studied to give a context to the main subject and another specific consultancy on the poultry market has already been planned. Nevertheless, in between other causes, two reasons stand out to justify this market inconsistency:

- The lack of infrastructure of processing and storage.
- The mechanisms of functioning and the distortions of the "poultry Borsa" in a market only partially and recently open to competition.

Therefore, we would like to suggest including these aspects in that planned consultancy.

We take the advantage in this section to mention two other aspects linked with a general improvement of poultry production.

The first one relates to a correct application of a bio-secure policy. If the final aim is the eradication of HPAI, the collaboration of everyone involved is required and the confidence in public institutions of all the breeders (also backyard) is a must. Therefore:

- The rules of culling and reimbursement have to be clear, appropriate and respected.

Also in this case a decision at national level has to be taken, particularly on culling policies as well as the amount of reimbursement, and the financial means have to be allocated.

The second one is the improvement of the access to facilities and services for farmers. We have seen there is a weak connection between agricultural co-operatives and small farmers.

- A study on this matter has to be prepared.

### **3.2. Backyard sector**

Also in this section, starting with table 2, we can do a similar exercise as before, with a few modifications based on different breeding conditions and management. We begin by passing over the few parameters sufficiently well implemented in this type of production system but also others that are not really appropriate for backyard breeding, such as: "mechanisation", "distance in between farms", "litter composition", "window grilles", "all in - all out", "external hygienic conditions & disinfections", "sanitary gap", "change and disinfections of cloths and shoes", "workers shower before entering". We also exclude "fenced pond" because, given the number of canals in Egypt, it will be impossible to even consider this. In table 8 we can see the result.

**Table 8.** Bio-security practices **poorly implemented** in the backyard sector

Enclosure preventing escape	Quarantine for new birds
Shelter	Quarantine for sick birds
Separation of bird species	Live in - dead out
Separation of ages	Internal hygienic conditions
Contact with wild birds	Internal disinfections
Contact with other animals	Workers' contact with other flocks
Presence of pests	Presence of visitors
Indoor feeding	Cleaning of working material
Water delivery	Disinfections of working material
Water spilling	Wash hands before & after handling
Food quality	Use of shared equipment
Food delivery	Disinfections of shared equipment
Prophylactic treatments	First work in clean then dirty area
Therapeutic treatments	Carcass disposal
Veterinary care	Litter disposal

### 3.2.1. Bio-security evaluation in the backyard sector

Here again, as in the farm sector, we can split up table 8, first by bio-security impact on AI and afterwards by limiting factors (and possibility of correct implementation). Finally we will merge the results in table 9. In the backyard sector the final result may be much more questionable. This is due to the fact that the rearing practices are much more varied and because the required financial effort may be seen differently in relation to personal economical conditions.

**Table 9.** Main practices grouped by their impact on bio-security and the grade of correct implementation in the backyard sector.

		Impact on AI control	
		Significant	Minor
Grade of correct implementation	Easy	Presence of visitors. Wash hands before & after handling. Carcass & litter disposal.	Cleaning of working material. First work in clean then dirty area. Internal hygienic conditions.
	Variable	Use of shared equipment. Workers' contact with other flocks. Enclosure preventing escape.	Water delivery. Food delivery.
	Difficult	Separation of bird species. Presence of pests. Food quality. Contact with wild birds. Contact with other animals. Quarantine for new birds. Indoor feeding. Disinfections of shared equipment. Live in - dead out.	Water spilling. Shelter. Separation of ages. Quarantine for sick birds. Internal & working material disinfections. Prophylactic & therapeutic treatments. Veterinary care.

Although the final picture of table 9 does not seem very exciting, before moving on, we would like to reconsider a few points:

- Any bio-security action correctly implemented decreases the risk of infection, however, a bio-security risk zero is not possible to obtain.
- It is more effective when the entire community changes one hazardous action rather than a few persons implementing a high bio-security protocol.

- The recent AI-crisis has clearly shown to all, consumers, producers and authorities the interest of following several sanitary rules. A general awareness of the risk of AI is now present in the population.
- Several responses, coming from the base, have already been proposed and implemented.

These can be important factors to consider and exploit in order to strengthen any implemented activity. In particular two basic rules of bio-security have been generally adopted during the AI-crisis: a strict confinement of birds and a correct disposal of litter and dead birds. We can consider these as the two strategic points of table 9 and if they are effectively implemented they will largely reduce the risk of the spread, not only of AI, but also of many other poultry and zoonotic diseases. Moreover, this means also two other things:

- First, that everybody understands the importance of these two practices.
- Second and more importantly, that these are realistic options, because they have been already implemented.

### 3.2.2. Recommendations to improve bio-security in the backyard sector

As we have seen before, it is important to support and strengthen these changed behaviours and different ways of doing this will be considered. The first one is to promulgate a law, but this will most likely be difficult to enforce because, as we have seen in other cases, social aspects are to be taken into consideration. So, the best way would be that the changes would rise from the society itself.

#### ➤ Increasing awareness on bio-security

The most effective way to achieve this goal would be to get in touch with the highest religious authority to pass two simple messages: to discourage the improper disposal of carcasses and litter and to discourage the system of free-ranging birds. Joined to this, a publicity campaign on these two subjects may avoid misunderstandings rising from personal interpretations or transmissions of the message.

#### ➤ Increasing public knowledge of the basic principles of bio-security

Everybody has heard about AI and programs on AI are occasionally present on different television channels. These programs, most often, are unbalanced and they either highlight the sensationalistic aspect, are highly technical, or too vague. As a result very few people really know this disease and we observed a widespread interest for information.

A public information campaign aimed at ensuring public knowledge on AI and on the small rules of bio-security that are easily affordable (presence of visitors, contact with other flocks, etc.) greatly help to improve all the simple daily practices and reduce the risk of disease. Television is surely the best way to reach people and the large majority of Egyptians have access to television. Therefore periodical broadcasts on AI have to be promoted. Starting with all we have said before, they have to pass on:

- Simple technical information.
- Practical suggestions on how to improve bio-security and breeding practices.
- Examples of hazardous actions.

A long-term collaboration with schools may also be implemented.

### 3.3. Recommendations to implement the suggested activities

To resume and to provide a frame to progress with practical activities, we can give the following recommendations.

#### ➤ Harmonisation of veterinary regulations

The FAO should stimulate an internal debate in the MALR to obtain a clear position on several sanitary regulations.

The FAO should sponsor and organise different workshops, with the participation of MALR, as well as other involved parties (namely Ministry of Health). An Egyptian consultant should organise and facilitate the work. The three main topics are:

- HPAI vaccination.
- Distance in between farms.
- Clear policy for stamping out and reimbursement.

It is essential to reach an agreement on these different points (at least the first two) before the implementation of the next recommendation.

#### ➤ Training and extension for farmers

The FAO, in collaboration with the veterinary services and the linked training department of the MALR, should prepare a detailed training manual for farmers.

An Egyptian consultant (with a veterinary education) should be recruited to co-ordinate the work, following the suggestions given in the section "Information and training of farmers". A second consultant will be associated. He will be in charge of the extension and communication aspects.

The FAO should sustain the cost of the two consultants and the cost of the reproduction of 30.000 copies of the manual (roughly the number of poultry farms in Egypt).

The veterinary services of MALR should give technical advice for the content of the manual. The training department of MALR should include this training in its own program and insure the training of farmers.

#### ➤ Increasing awareness & local knowledge on basic principles of bio-security

The FAO and the MALR jointly should get into contact with the highest religious authority to point out their readiness to collaborate on the points raised in the section "Increasing awareness on bio-security". A workshop to explain the reasons for this message should be organised. If an agreement for collaboration is reached, special attention has to be paid to the message to be transmitted, namely the one on confined birds. If no or only partial readiness to help is obtained, only the publicity campaign and educational broadcasts should be executed.

A consultancy, composed by an expert on communication and a veterinarian, should be organised. The main tasks will be to explore:

- The possible collaboration with an important television channel on broadcasts on AI.
- A publicity campaign on improper disposal of carcasses and litter and on confinement of birds.
- The collaboration with the Ministry of Education and other UN organisations (e.g. UNICEF) on the introduction of instructive subjects as a matter of public education.

For each of these arguments several points have to appear clearly: an evaluation of what has already been done; the identification of interested and suitable partners, the description

of their tasks, the costs involved and the human and material input for each partner, and a timetable for the implementation of each activity. Afterwards, for each argument the following specific points have to be highlighted.

- Television broadcasts on AI: A draft of the different subjects evaluated for each episode, best timing for broadcasting, need and means of publicity to ensure a good audience and frequency of future broadcasts.
- Publicity campaign: Evaluation of the most effective way to pass the message (television, placards, newspapers) and the need of frequency/number of related broadcasts / posters / insertions.
- Instructive subjects as a matter of public education: A plan of the contents of the instruction booklet that has to include not only AI, but also other subjects such as traffic rules, recycling of material, personal hygiene and balanced alimentation, etc., mode of training of teachers and the necessity of printed booklets.

The FAO should act as the sponsor of all these activities and hold the final validation before sponsoring any of them.



### Consultancies

A specific consultancy on the poultry market has already been prepared. Nevertheless, here we would like to suggest two issues:

- To explore the reasons of the high poultry product price fluctuation, in particular, the "poultry Borsa" (Mechanism of functioning, independency, distortions, possible solutions, etc) and the infrastructures of transformation and storage (necessity, social acceptance, impact on the market, etc.). Also a partial solution will have a big impact on quality and quantity of the Egyptian poultry production.
- To investigate the viability of organising slaughtering points at the weekly live bird markets.

In order to improve access to services for farmers, a study on agricultural co-operatives has to be foreseen.

## 4. **Annexes.**

## **Annex 1 : Terms of Reference**

### ***Issue and Options for Improving the Bio-Security of Small Poultry Production in Egypt***

#### **Introduction**

After the initial outbreaks of HPAI in Southeast Asian countries in 2003, the disease has spread to an increasing number of countries and regions, including Egypt. In order to control the disease, measures for increased bio-security and restructuring of the poultry sectors have been proposed. Some of these proposals include suggestions for restricting the village poultry even banning complete production systems. In 2004, FAO defined four main poultry production sectors, numbered 1 to 4, with the sectors three and four representing small-scale production systems. Sector 3 comprises small scale, commercial farms involving either broilers, layers and ducks, while sector 4 includes backyard, indigenous and scavenging birds in mixed farming systems. Restructuring to improve bio-security is considered especially important for the two sectors 3 and 4. Alternative options could include improvements and increased bio-security measures within the small scale poultry sectors. A review of these options, considering the special conditions of small poultry productions, the feasibility and cost of implementation and their potential impacts on future contribution of small poultry production is required.

#### **Job description**

Under the technical supervision of the Chief of the FAO Animal Production Service (AGAP) the consultant will describe and analyze opportunities for improving bio-security in the Sectors 3 and 4 poultry systems of Egypt. Information will be sourced from field investigations, interviews, the consultant's own experience and reviews of literature. The results will be presented and discussed in an issues and options paper that will include:

- A concise description of the Sectors 3 and 4 systems in Egypt and a review of the bio-security limitations in each of the systems.
- A description of the necessary preconditions for improving bio-security in the small-scale poultry sectors.
- A review of the major options for improving bio-security in each of these systems including the technical, institutional, logistical and financial implications of each option.
- Develop a strategy to implement such options for smallholders

The consultant will also pay particular attention to the service delivery and marketing aspects (producers, middlemen, collectors, suppliers of inputs, distributors, village rules, service sector, producer organisations, regulations and authorities including tax and trade regulations, processors, slaughterhouse, marketplace and consumers) in producing that the report.

The following interventions are commonly raised in the context of improving bio-security and their practicality, consequences and importance should be analysed and commented upon in the reports:

- Restricting number of birds and flock size
- Preventing the mixing of species
- Restricting marketing and movements of poultry

- Culling for disease control
- Confinement/fences/buildings
- Vaccination

### **Expected Output**

- A report entitled "Issues and Options for Improving the Bio-security of Small-scale Poultry Production in Egypt". The report will be in English with an indicative length of between 10 -15 000 words and submitted in an electronic format in Microsoft Word. A detailed annotated outline of the report will be submitted to AGA for approval. The final version will be prepared to a level suitable for publication by FAO and submitted by end January 2007.

### **Target groups**

Decision makers, professional poultry personnel and scientists

### **Duration**

21 days for field investigations in Egypt (December 2006) and 10 days for report writing (home) with 3 days in Rome for a debriefing in January 2007.

## **Annex 2 : Encountered persons.**

Mr. Chikhaoui Ahmed. FAO Representative in Egypt.  
Mr. Talib Murad Ali Elam. Chairman Federation of United Nations Staff Association & Union in Egypt.  
Mr. Osterhaus Ab. Director of the WHO National Influenza Centre. Rotterdam.  
Mr. Douglas Ian.  
Mrs. Mona M. Ali. Central Laboratory for Veterinary Quality Control on Poultry Production. Ministry of Agriculture. Cairo  
Mr. Aidaros Hassan. Prof. of Hygiene and Preventive Medicine. Faculty of Veterinary Medicine Banha University of Cairo.  
Mr. Salim Mohamad. Director of poultry sector. Veterinary Services Sharkia Governorate.  
Mr. El-Saied M. Mamdoh. Director for development Centre of Environment of Zagazig.  
Mr. Libdah M. Abdelazis. Prof. of Avian and Rabbit disease. Faculty of Veterinary Medicine of Zagazig.  
Mr. El-Sayed M. El-Sayed. Director Veterinary Services Dakahlia Governorate.  
Mr. Mokamodien J. Mokamodien. Director of bio-security. Veterinary Services. Dakahlia Governorate.  
Mr. El-Zaiet Mahmod. Director of poultry sector. Veterinary Services Dakahlia Governorate.  
Mr. El-Abd M. Owis. Director Veterinary Services Fayoum Governorate.  
Mr. El-Gavad M. A. Mohamed. Director of bio-security. Veterinary Services. Fayoum Governorate.  
Mrs. Etedal A. S. Mohamed. Director of poultry sector. Veterinary Services Fayoum Governorate.  
Mrs. Omima A. Kabil. Director of vaccine sector. Veterinary Services Fayoum Governorate.  
Mr. Ahmed M. Ahmed. Director of hatchery and laboratory. Integrate Poultry Project in El-Azap.

A number of encounters with:

- Backyard, small, medium and large poultry breeders.
- Ex-backyard and small breeders stricken by AI.
- Traditional hatchery workers.
- Traditional "laboratories" workers.
- Veterinary Services at District and local level.
- Poultry-feed producer.
- Poultry veterinary input suppliers.
- Private veterinarian.
- Poultry retailers and ex-retailer.
- Poultry collectors and middleman.
- Poultry slaughterhouse responsible.
- Consumers

### **Annex 3 : Semi-structured interviews.**

- 1 Backyard and small poultry breeders.
- 2 FAO Egypt.
- 3 National Veterinary Services.
- 4 Local Veterinary Services.
- 5 Resource persons for legislation, tax and trade control.
- 6 Training and extension services.
- 7 Official Village authorities.
- 8 Traditional Village authorities.
- 9 (Micro-)finance institutions.
- 10 Small farmers organisations.
- 11 Responsible of poultry market.
- 12 Responsible of Slaughterhouse.
- 13 Responsible of Laboratory.
- 14 Responsible of industrial poultry production.
- 15 Retailers, middlemen and collectors of poultry.
- 16 Suppliers and distributors of poultry zootechnical and veterinary inputs.  
Veterinary pharmacies.
- 17 Producers of poultry zootechnical and veterinary inputs.
- 18 Private Veterinaries.
- 19 Consumers.
- 20 Scientists.

#### **1 Backyard and small poultry breeders.**

- Identification of the interviewed person.
  - Date. Age. Sex.
  - Governorate. Lower administrative division. Village
- Principal activities in the exploitation.
  - Agriculture, Breeding, Fishing, Hunting, Apiculture, Crafts, Employment, Commerce, Other.
- Since when (s)he does this work?
- Where did (s)he learn to breed poultry?
- Did (s)he follow training on poultry breeding? Which? Where?
- Source of information on breeding (Neighbours, Relatives, Veterinary, Radio, ...)
- Bred animals.
  - Bovines, small ruminant, pigs, asses, horses, camels, rabbits, bees, dogs, cats, others.
  - Chickens, ducks, geese, quails, pigeons, turkeys, pet birds, other ..... How many? Local. Improved local. Exotic?
  - If commercial. How many cycles / year? How many birds / cycle ?
  - If commercial. Destination of old animals. Age.
- Do they live together? (pig, quails). What problem would it be to divide different species?
  - Birds ownership.
  - How did (s)he obtain the birds?
  - Entrusted animals. From/to Why When
- Use of shared farm equipment and vehicles with other farmers.
- Do wild birds be in contact with the flock?
- Do you exchange cocks for reproduction?
- Do you buy birds in the market for your consumption.
- Poultry rearing and zootechnical knowledge.
  - Who takes care of de birds? What (s)he do?
  - Feeding. How. When.
  - Watering. How. When. Source of water.
  - Mineral and vitamins complementation. How. When.
  - Housing. Hen-house. Night shelter. Enclosure. House. Litter.

- What problem would it be to fence in poultry?
- Origin of the flock. (adults / chicks / eggs).
- Isolation period for all new stock.
- Origin of others input. (Drugs, food).
- Do other people have contact with the flock?
- Use of footwear / footbath / scrub shoes before and after contact with birds.
- Hand washing before and after bird handling.
- Do wild birds mix with the flock? "Bird feeders" or "Pond" on the property that attracts wild birds.
- Custom to move birds to locations (fairs, shows, market, etc.) where other birds are present and returned the birds to the flock.
- Custom to visit places with live birds (poultry market, feed store with birds, fair, neighbour's flock, etc.).
- Someone in the household worked for a commercial poultry production, processing facility, poultry market, etc.
- Number of birds that died in the last 12 months
- Carcass disposal. (Incinerate. Bury on premises. Compost. Taken to a rubbish tip or trash. Fed to other animals. Fed to man. Other ..... ).
- Poultry litter / manure disposal. (Place in manure shed / composted, Leave in an outdoor pile. Spread on garden at premises location. Taken to a rubbish tip or trash. Sell or give away. Do not have enough litter to deal with. Food for fish. Other ..... ).
- Use of shared farm equipment and vehicles.
- Ethno-veterinary knowledge.
  - Known diseases. (How to recognise. Danger for man. Frequency in the year. Origin. Prevention. Modern and traditional therapies).
  - Planned medical actions. Vaccination. External/internal de-worming. Antibiotics.
  - What problem would it be to have more compulsory vaccination. (time, money, labour, ...)
  - Hen-house and yard cleaning / disinfections.
  - Isolation period for all new stock (quarantine).
  - Veterinary and drugs availability.
  - Avian flu knowledge. Response to the outbreak.
- Poultry and products utilisation.
  - Eggs, meat, manure, feather, ...
  - Function. (Saving. Auto-consumption. Religious. Social relations. Manure. Prestige. Hobby.)
  - Sale. Which. Raison. Who sells. When. Where. To who. How?
- Do you receive credit for your breeding
  - Bank or similar. Dealer of input / birds. State. Friends. Other
- Member of producer organisations?
- Relation with veterinary and training services.
- Action settled out after AI outbreak.
  - Received reimbursement after stamping out.
- Principal worry in the exploitation. (Feeding, water, theft, loss, sale, health, predator, inputs, Knowledge, space, ....)

To indicate the reliability of the answers given by the person interviewed

## 2 FAO Egypt.

- Identification of the interviewed person.
  - Date. Name. In charge of ... Contact address.

Validation ToR.

- To harmonize the expectancies of different parties.
- To adapt the work plan of the mission.

Logistic.

- Office facility in Cairo and in the Governorate.

- Logistical means.
- To identify the possibility of getting documents.

### **3 National Veterinary Services.**

- Identification of the interviewed person.
  - Date. Name. In charge of ... Contact address.
- Organisation and operational system.
- Land coverage.
- Personnel tasks.
  - Activity in the field.
  - Activity not carried out. Why?
- External support (money / logistic / labour).
- Presence of private veterinary in the zone.
- Utilisation of private veterinary and para-veterinary.
- Financial and material resources.
- Monitoring and evaluation system for diseases.
- Programmed / compulsory sanitary controls.
- Compulsory treatments / prophylaxis for poultry breeders. (AI,ND)
  - For backyard and little breeders.
  - Are they carried out?
- Principal poultry sanitary problem in the country (Out of AI)
- Linked research and training institutes.
  - Name and address.
  - Land coverage.
  - Activity in the field.
- Principal problems of the service.
- Sanitary legislation on poultry.
- Problems to enforce legislation (namely on AI).
- Weak and strong points of actual legislation.
- Producers of poultry zootechnical and veterinary inputs. (vaccine).
  - Name and addresses.
- Farmer organisations.
  - Name and addresses.
- (Micro)-finance institutions in the country.
  - Name and addresses.
  - Land coverage.
- Politic and strategy of the Ministry on Avian Flu. Data.
  - Current responses.
  - How are AI cases reported? By whom?

### **4 Local Veterinary Services.**

- Identification of the interviewed person.
  - Date. Name. In charge of ... Contact address.
  - Governorate. Lower administrative division.
- Organisation and operational system.
- Land coverage. Number of technicians (also private veterinaries).
- Implemented tasks. Activities not carried out. Why?
- Utilisation of private veterinary and para-veterinary.
- Received training. When? Subjects.
- Central / External support.
- Financial and material resources.
- Possibility to enforce sanitary control.
- Availability of sampling sets.
- Linked research and training institutes.
  - Activity in the field.

- Activity not carried out. Why?
- Small poultry producer and backyards chickens in the zone.
  - Importance.
  - Breeding techniques and planned medical actions.
- Principal problems of the service.
- Possibility to enforce the legislation.
- Weak and strong points of actual legislation.
- Producers of poultry zootechnical and veterinary inputs in the zone. (vaccine).
  - Name and address.
- Farmer organisation in the zone.
  - Name and address.
- Institution of rural credit in the zone.
  - Name and address.
- Poultry sanitary problems in the zone.
- Implemented actions to fight Avian Flu. Data.
- Poultry infrastructures in the zone (marketplaces, slaughterhouse, laboratories).
- Big poultry producers.
  - Name and address.

## **5 Resource persons for legislation, tax and trade control.**

- Identification of the interviewed person.
  - Date. Name. In charge of ... Contact address.
  - Governorate. Lower administrative division.
- Bird-rearing legislation (namely on AI).
  - Strong and weak points of actual legislation.
  - Need of change.
  - Possibility to enforce.
- Public support of poultry breeders (namely little).
- Import / export data.
  - Meat, eggs, live animals, food, integrators, vaccine, antibiotics.
  - Origin import / destination export.
- Data on inner Egyptian production.
  - Meet, eggs, alive animals, food, integrators, vaccine, antibiotics.
- Duty level.
  - Meet, eggs, alive animals, food, integrators, vaccine, antibiotics.
- Reliability data.

## **6 Training and extension services.**

- Identification of the interviewed person.
  - Date. Name. In charge of ... Contact address.
  - Governorate. Lower administrative division.
- Organisation and operational system.
- Land coverage.
- Implemented tasks. Activities not carried out. Why?
- Received training. When? Subject.
- Central / External support.
- Financial and material resources.
- Principal problems of the service.
- Implemented action in response to Avian Flu. Data.
- Poultry infrastructures in the zone (marketplaces, slaughterhouse, laboratories).
- Relation with little poultry producer and backyard chickens in the zone.
- Big poultry producers of the zone.

## **7 Official village authorities.**

- Identification of the interviewed person.

- Date. Name. In charge of ...
- Governorate. Lower administrative division. Village.
- Importance of poultry for farmers
- Problems of the farmers.
- Problems linked with AI.
- Relation with the traditional authorities.

### **8 Traditional village authorities.**

- Identification of the interviewed person.
  - Date. Name. In charge of ...
  - Governorate. Lower administrative division. Village.
- Since when he had this role?
- Traditional laws that regulate the traditional leader positions?
- Describe his activities / duties. (namely in the poultry sector)
- Describe the duties of the community he supervises.
- Importance of poultry for farmers
- Problems of the farmers.
- Problems linked with AI.
- Relation with the official authorities.
- Possibility of intervention in the family poultry sector.

### **9 (Micro-) finance institutions.**

- Identification of the interviewed person.
  - Date. Name. In charge of ... Governorate. Lower administrative division.
- Do they provide credits to farmers? Which activity?
- Protocol of credits.
  - Who can be admitted financing? Duration. Warranty. Minimum / maximum. Interest.
- Zones of intervention of the institution.

### **10 Small farmer organisations.**

- Identification of the interviewed person.
  - Date. Name. In charge of ... Contact address.
  - Governorate. Lower administrative division.
- History
- Operation.
- Land presence.
- Services and activity.
- Condition of support.
- Benefit for members
- Financial and material resources.
- Priority needs for the recipient.
- Principal problems.
- Future plans.
- Relation with others state and private structures working in the poultry sector.

### **11 Responsible of poultry markets.**

- Identification of the interviewed person.
  - Date. Name. In charge of ... Governorate. Lower administrative division.
- Market organisation (ownership, management, financial support).
- Exposed animals.
  - Zone of origin of animals. Specie. Quantity. Presented alive or dead.
- Presence of veterinary services.
- Presence of cleaning service.
- Restricted areas.
- Loading and unloading areas.

- Slaughterhouse in the market.
- Frequency of the market. Closing days.
- What is envisaged in case of presence of sick or dead animals.
  - When last time?
- Compartmentalization different areas.
- Other markets nearby.
- Market before and after AI.
- Typology of sellers. (Small / big producer, Middleman, ...).
- Typology of buyers.
- Problem of the market. (Sanitary, Logistic, ...).
- Taxes for retailers / consumers.

## **12 Responsible of slaughterhouses.**

- Identification of the interviewed person.
  - Date. Name. In charge of ... Governorate. Lower administrative division.
- Slaughterhouse organisation (ownership, management, sponsor).
- Slaughtered animals.
  - Zone of origin of animals. Specie. Quantity. Destination.
- Presence of veterinary services.
- Presence of cleaning service.
- Disposal of residual.
- Closing days.
- Compartmentalization of different areas.
- Other slaughterhouses
- Typology of users. (Small / big producer, Middleman, ...).
- Problem of the slaughterhouse.
- Taxes for slaughtering.
- If possible to interview owners of animals, buyers, users, ...

## **13 Responsible of laboratories.**

- Identification of the interviewed person.
    - Date. Name. In charge of ... Governorate. Lower administrative division.
  - Laboratory organisation (ownership, management, sponsor, land coverage).
  - Analysis capacity for poultry pathologies. (Sort, Quantity).
  - Financial means. Do they have sample kits?
  - Who pays for analysis?
- Training of technicians.

## **14 Responsible of industrial poultry production.**

- Identification of the interviewed person.
  - Date. Name. In charge of ... Governorate. Lower administrative division.
- Origin of animals, feed, drugs.
- Possibility to check safety of input.
- Sanitary rules in his farming.
  - All-in, All-out.
  - Persons allowed to access birds.
  - Compartmentalization.
- Place where (s)he sells.
  - Buyers. What. Price. Why.
- Veterinary services.
- Knowledge of AI. Response.
- Do small producers have any impact on your market?

## **15 Retailers, middlemen and collectors of poultry.**

- Identification of the interviewed person.

- Date. Name. In charge of ...Governorate. Lower administrative division.
- Origin of birds.
- Places for selling.
- To buy and to sell. Buy credit or cash?
- Market before and after AI. (Other sanitary problems).
- Product that the consumers prefers. Prices of selling different products.
- Principal problems on work.
- If possible, prices of buying of different products.
- Impact of AI.

## **16 Suppliers and distributors of zootechnical and veterinary inputs.**

### **Veterinary pharmacies.**

- Identification of the interviewed person.
  - Date. Name. In charge of ...Governorate. Lower administrative division.
- List of material. Purchase price.
- Origin of products.
- Places of sale.
- Problem of provisioning / importation.
- Possibility of ordering products.
  - Time of deliveries. Minimal quantities.
- Legal aspects (tax and authorisations)

If possible, visit the store and check storage and presence of out-of-date material.

## **17 Producers of poultry zootechnical and veterinary inputs.**

- Identification of the interviewed person.
  - Date. Name. In charge of ...Governorate. Lower administrative division.
- List of material. Purchase price and origin of input.
- Producing capacity.
- Places of sale.
- Problem of provisioning / importation of commodity.

## **18 Private veterinaries.**

- Identification of the interviewed person.
  - Date. Name. In charge of ...Governorate. Lower administrative division.
- Zone of work.
- Since when (s)he is practicing?
- Principal interventions requested by poultry breeders of sector 1, 2, 3 and 4.
- Importance of poultry for small breeders.
- Sanitary problem in the region.
- Availability of sampling sets.
- Zootechnical knowledge of breeders.
- Other activities related to the private practice (trade inputs, vaccination campaign, ...)
- Presence of false drugs.
- Principal problems encountered. Impact of AI.
- Believes of people with regard to AI.

## **19 Consumers.**

- Identification of the interviewed person.
  - Date. Where as been encountered (market, road, ... ).
  - Governorate. Lower administrative division.
- Where do you buy your chicken (meat)?
- Which meat do you prefer (birds, others)?
- You prefer to buy alive or dead? Why?
  - Difference of price.
- Do you have poultry breeding at home?

- If yes, why you also buy?
- Do you hear about AI?
  - If yes, what have you done?

## **20 Scientists.**

- Identification of the interviewed person.
  - Date. Name. In charge of ... Contact address.
- Role of wild birds in AI transmission.
- Role of trade deregulation.
- Genetic resistance for native chickens to HPAI.
- Effectiveness of DIVA vaccines and availability on the market.
  - AI + ND vaccines.
- Effectiveness of Tamiflu.
- Responsibility of industrial poultry farms for mutating LP in HP.
- Possibilities for mutations as a result of wild spread vaccinations.

**Annex 4 : Structured interview. Backyard and little poultry breeders.**

Date: ..... Breeder identification number: / /  
 Governorate: ..... District: ..... Village: .....  
 Kind of exploitation a Urban ☺ Peri-urban ☺ Rural ☺  
 b Backyard ☺ Top roof ☺ Balcony ☺ Small producer ☺  
 c FAO identification N. ....

**A. Identification of the family unit / exploitation and of the interviewed.**

- A.1** Age of the breeder: Years .....
- A.2** Sex of the breeder: Man ☺ Woman ☺
- A.3** Are you the owner of this exploitation? Yes ☺ No ☺
- A.4** Are you the responsible of this exploitation? Yes ☺ No ☺  
 If no. Relation whit responsible Wage-earner ☺ Relative ☺ Other ☐ .....
- A.5** Do you know to read? Yes ☺ No ☺
- A.6** Did you go to primary school? Yes ☺ No ☺

**A.7** Which are the main activities in this household? (To number by importance the first 4 activities).

Agriculture	Breeding	Fishing	Commerce	Handicraft	Employment	Beekeeping	Other (which)
.....	.....	.....	.....	.....	.....	.....	.....

**A.8** How many persons live in this family unit? **A.8a** Adults N. ....

**A.8b** Boys N. ....

**A.8c** Girls N. ....

**A.9** How many children go to school in this family unit? **A.9a** Boys N. ....

**A.9b** Girls N. ....

- A.10** Do you have a means of transport? Yes ☺ No ☺  
 If yes. Which one? Bike ☺ Donkey ☺ Motorbike ☺ Car ☺  
 Tractor ☺ Lorry ☺ Other ☺ .....

**B. Identification of the livestock exploitation.**

**B.1** Did you have any training on animal health? Yes ☺ No ☺

**B.2** How many persons work with animals in this family unit? **B.2a** Adults N. ....

**B.2b** Children N. ....

**B.3** Which are the sources of information with regards to breeding? (To number by importance the first 2 sources).

Neighbours	Relatives	Veterinary	Training services	Newspapers	Radio	Other (which)
.....	.....	.....	.....	.....	.....	.....

**B.4** Which animals your exploitation breeds, out of birds? (If possible ask approximately for the number).

Cattle	Small ruminants	Pigs	Donkeys Horses	Camels	Dogs	Cats	Rabbit	Other (which)
.....	.....	.....	.....	.....	.....	.....	.....	.....

**B.5** Who usually takes care of animals? You can cross more than 1 answer .

Cattle	Small ruminants	Pigs	Donkeys Horses	Camels	Dogs	Cats	Rabbit	Other (which)
M W C E O	M W C E O	M W C E O	M W C E O	M W C E O	M W C E O	M W C E O	M W C E O	M W C E O

(M = Man, W = Woman, C = Children, E = wage-Earner, O = Others .....

**C. Identification of the poultry exploitation.****C.1** What sort of birds does your family breed? (If possible ask approximately for the number).

Chickens	Ducks	Geese	Quail	Pigeons	Turkeys	Pet birds	Other (which)

**C.2** Which type of chicken's breed you have? Local ☺ Improved local ☺ Exotic ☺

If Local, the name of the breed. Balady ☺ Fayoumi ☺ Dandarawy ☺

Sinai ☺ Others ☺

If Exotic, the type of the breed. Layer ☺ Broiler ☺

**C.3** If commercial. How many cycles each year? N. cycles .....

How many birds each cycle? N. birds.....

**C.4** Who are the owners of the birds? (You can cross more than 1 answer).

Chickens	Ducks	Geese	Quail	Pigeons	Turkeys	Pet birds	Other (which)
M W B	M W B	M W B	M W B	M W B	M W B	M W B	
G O	G O	G O	G O	G O	G O	G O	M W B G O

(M = Man, W = Woman, B = Boys, G = Girls,, O = Others .....

**C.5** Do you breed also entrusted birds? Yes ☺ No ☺ If yes. Which one?

Chickens	Ducks	Geese	Quail	Pigeons	Turkeys	Pet birds	Other (which)

**C.6** When did you received the last entrusted bird? If Yes. Number of months ago .....**C.7** Where do you buy birds for your flock (You can cross more than 1 answer).

Chickens	Ducks	Geese	Quail	Pigeons	Turkeys	Pet birds	Other (which)
B L R	B L R	B L R	B L R	B L R	B L R	B L R	
S G O	S G O	S G O	S G O	S G O	S G O	S G O	B L R S G O

(B = self-Breed, L = Local Market, R = Regional market, S = Supplier, G = Gift, O = Others).

**C.8** When was the last time a new bird arrived in your flock? Months ago .....**C.9** Are the birds separated or can they mix with other animals? Separate ☺ Mix ☺**C.10** Do wild birds sometimes mix with the flock? Yes ☺ No ☺**C.11** Do you buy birds in the market for your consumption? Yes ☺ No ☺ Sometimes ☺

If Yes or Sometimes. Where are they slaughtered? Home ☺ Market ☺ Other ☺ ....

**C.12** Who usually buys the birds? (You can cross more than 1 answer).

Man ☺ Woman ☺ Children ☺ Other ☺ .....

**C.13** Do you exchange cocks for reproduction? Yes ☺ No ☺ Sometimes ☺**C.14** Principal function of poultry? (You can cross more than 1 answer).

Chickens	Ducks	Geese	Quail	Pigeons	Turkeys	Pet birds	Other (which)
V C A	V C A	V C A	V C A	V C A	V C A	V C A	
S O	S O	S O	S O	S O	S O	S O	V C A S O

(V = saVing, C = Commercial, A = Auto-consumption, S = Social relations, O = Other .....

**C.15** Principal utilisation of the Eggs. (To number by importance only the real utilisation).

Sale	Auto-consumption	Reproduction	Social relation	Other (what)

**C.16** Principal utilisation of the bird meat. (To number by importance only the real utilisation).

Sale	Auto-consumption	Social relation	Other (what)

**C.17** Principal utilisation of the feather. (To number by importance only the real utilisation).

Sale	Pillow	Ornament	Throw away	Other (what)

**C.18** Who usually sells the birds? (You can cross more than 1 answer).

Man ☐ Woman ☐ Children ☐ Other ☐ .....

**C.19** Where you usually sale the birds? (You can cross more than 1 answer).

Chickens		Ducks		Geese		Quail		Pigeons		Turkeys		Pet birds		Other (which)
M	P	M	P	M	P	M	P	M	P	M	P	M	P	
C	O	C	O	C	O	C	O	C	O	C	O	C	O	M P C O

(M = Market, P = to Private, C = to Collectors, O = Others .....

**C.20** Why you usually sell the birds? (You can cross more than 1 answer).

Chickens			Ducks			Geese			Quail			Pigeons			Turkeys			Pet birds			Other (which)
F	G	R	F	G	R	F	G	R	F	G	R	F	G	R	F	G	R	F	G	R	
S	M	O	S	M	O	S	M	O	S	M	O	S	M	O	S	M	O	S	M	O	F G R S M O

(F = for little Family needs, G = when I have Guest, R = Regularly sold, S = when they are Sick, M = when they are too Many, O = Other .....

**C.21** Do you get a credit for your breeding? Yes ☐ No ☐

If yes. From whom? Bank or similar institution ☐ State ☐ Friends ☐ Dealer of input ☐ Dealer of birds ☐ Other ☐ .....

**C.22** Do you have others birds somewhere else? Yes ☐ No ☐

If yes. what? Farm ☐ Entrusted birds ☐ Other house ☐ Other .....

#### D. Poultry rearing.

**D.1** Who usually takes care of the birds? (You can cross more than 1 answer).

Chickens			Ducks			Geese			Quail			Pigeons			Turkeys			Pet birds			Other (which)
M	W	C	M	W	C	M	W	C	M	W	C	M	W	C	M	W	C	M	W	C	
E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	M W C E O	

(M = Man, W = Woman, C = Children, E = wage-Earner, O = Others .....

**D.2** Do you regularly feed the birds? Yes ☐ No ☐

If yes. Which kind of food? Home residue ☐ Home made food ☐ Harvest residue ☐ Industrial food ☐ Other ☐ .....

**D.3** Do you regularly water birds? Yes ☐ No ☐

If yes. How do you water? Automatic ☐ Bell drinkers ☐ Bowl on the ground ☐

**D.4** Source of water for birds? Tap ☐ Well ☐ Canal/river ☐ Other ☐ .....

**D.5** Do you give regularly mineral and/or vitamins to the birds. Yes ☐ No ☐

**D.6** Have other people contact with the flock? Yes ☐ No ☐ Sometimes ☐

**D.7** Do the birds have a shelter? No ☐

Chickens		Ducks		Geese		Quail		Pigeons		Turkeys		Pet birds		Other (which)
H	S	H	S	H	S	H	S	H	S	H	S	H	S	
U	O	U	O	U	O	U	O	U	O	U	O	U	O	H S U O

(H = Hen-house, S = night Shelter, U = hUman house, O = Others .....

**D.8** Do the birds have an enclosure? Yes ☐ No ☐

If no. What is the reason? Lack of time ☐ Lack of money ☐ Lack of labour ☐ Nobody explain ☐ Other ☐ .....

**D.9** Do you regularly clean the shelter, enclosure, yard? Yes ☐ No ☐

If yes. With what? Broom ☐ Water ☐ Soap ☐ Disinfectant ☐ Other ☐ .....

**D.10** Do the birds mix together? Yes ☐ No ☐ Sometimes ☐

**D.11** Do the birds have a litter? Yes ☐ No ☐

If no. What is the reason? Lack of time ☐ Lack of money ☐ Lack of material ☐ Lack of labour ☐ Nobody explain ☐ Other ☐ .....

**D.12** Do you buy chicks to breed? Yes ☺ No ☺ Sometimes ☺  
 If yes. Where? Local market ☺ Regional market ☺ From private ☺  
 From producer ☺ From dealer ☺ Other ☺ .....

**D.13** Do you buy eggs to hatch? Yes ☺ No ☺ Sometimes ☺  
 If yes. Where? Local market ☺ Regional market ☺ From private ☺  
 From producer ☺ From dealer ☺ Other ☺ .....

**D.14** Do you buy adult birds to breed? Yes ☺ No ☺ Sometimes ☺  
 If yes. Where? Local market ☺ Regional market ☺ From private ☺  
 From producer ☺ From dealer ☺ Other ☺ .....

**D.15** Which sanitary action do you do regularly (scheduled)? (You can cross more than 1 answer).

Chickens	Ducks	Geese	Quail	Pigeons	Turkeys	Pet birds	Other (which)
V I E	V I E	V I E	V I E	V I E	V I E	V I E	
A D O	A D O	A D O	A D O	A D O	A D O	A D O	V I E A D O

(V=Vaccination, I=Internal de-worming, E=External de-worming, A=Antibiotics, D=shelter Disinfection, O=Others .....

**D.16** Which sanitary action do you do at times? (You can cross more than 1 answer).

Chickens	Ducks	Geese	Quail	Pigeons	Turkeys	Pet birds	Other (which)
V I E	V I E	V I E	V I E	V I E	V I E	V I E	
A D O	A D O	A D O	A D O	A D O	A D O	A D O	V I E A D O

(V=Vaccination, I=Internal de-worming, E=External de-worming, A=Antibiotics, D=shelter Disinfection, O=Others .....

**D.17** Do you add regularly antibiotics / growth promoters to the food of birds? Yes ☺ No ☺

**D.18** Where do you buy poultry drugs? (You can cross more than 1 answer).

At the market ☺ From private ☺ From producer ☺  
 From dealer ☺ At the pharmacy ☺ From veterinary ☺ Others ☺ .....

**D.19** Where do you buy poultry food? (You can cross more than 1 answer).

At the market ☺ From private ☺ From producer ☺  
 From producer ☺ From dealer ☺ Others ☺ .....

**D.20** It is easy to find poultry drugs? Yes ☺ No ☺ Human medicine ☺

**D.21** Do you know if there is a black market for poultry drugs? Yes ☺ No ☺  
 If yes. Which drug? Deworming ☺ Vaccines ☺ Antibiotics ☺ Other ☺ .....

**D.22** Do you use of footwear, footbath or scrub shoes before and after contact with birds?

Yes ☺ No ☺ Sometimes ☺

**D.23** Do you wash your hand before and after handling birds?

Yes ☺ No ☺ Sometimes ☺

**D.24** Do you have on your property "Wild-bird feeders" or "Pond" that attracts wild waterfowl?

Yes ☺ No ☺

**D.25** Are you used to move birds to locations (fairs, shows, market, etc.) where other birds are present, and then return the birds to the flock? Yes ☺ No ☺ Sometimes ☺

**D.26** Are you used to visit places with live birds ( poultry market, feed store with birds, fair, neighbour's flock, etc.)? Yes ☺ No ☺ Sometimes ☺

**D.27** Do new birds have an isolation period before to be introduced in the old stock?

Yes ☺ No ☺ Sometimes ☺

**D.28** Does someone in the household works in a place in contact with birds (commercial poultry production, poultry market, slaughterhouses, etc.)? Yes ☺ No ☺

**D.29** How do you dispose of the carcass of dead birds?  
 Taken to a rubbish tip or trash ☺ Incinerate ☺ Buried ☺ Throw away ☺  
 Fed to other animals ☺ Fed to man ☺ Compost ☺ Other ☺ .....

**D.30** How many birds died since El Aid El Kabeer? Number .....

**D.31** How do you dispose of poultry litter / manure?  
 Place in manure shed / composted ☺ Leave in an outdoor pile ☺ Food for fish ☺  
 Taken to a rubbish tip or trash ☺ Sell or give away ☺ Spread on garden ☺  
 Do not have enough litter to deal with ☺ Throw away ☺ Other ☺ .....

**D.32** Do you use farm equipment or vehicles shared with other farmers?  
 Yes ☺ No ☺ Sometimes ☺

**D.33** Do you clean and disinfect before a new use the shared material?  
 Yes ☺ No ☺ Sometimes ☺

**D.34** Do you call the veterinary for your poultry? Yes ☺ No ☺ Sometimes ☺  
 If no. Why? There is no one ☺ They are far ☺ They are expensive ☺  
 I have no problem ☺ I have a friend ☺ They made mistakes ☺  
 Other ☺ .....

**D.35** Would you find it a problem to vaccinate your birds, If vaccinations were compulsory and free? Yes ☺ No ☺ Sometimes ☺  
 If yes or sometimes. Why? Time ☺ Labour ☺ Vaccination give diseases ☺  
 I don't like vaccination ☺ Other ☺ .....

**D.36** Do you know any poultry disease? Yes ☺ No ☺  
 If yes. Which one? Worms ☺ External parasites ☺ Newcastle ☺ Gumboro ☺  
 Avian Pox ☺ Influenza ☺ Salmonellosis ☺ Other ☺ .....

**D.37** Are they dangerous for man? Yes ☺ No ☺  
 If yes. Which one? Worms ☺ External parasites ☺ Newcastle ☺ Gumboro ☺  
 Avian Pox ☺ Influenza ☺ Salmonellosis ☺ Other ☺ .....

**D.38** Which are your principal worries in the exploitation? (To number by importance the first 4 worries).

Feeding	Watering	Sale	Diseases	Predators	Theft	Loss	Space	Input	Knowledge	Other (what)

**D.39** What have you done to protect your breeding from Avian Influenza?  
 Reduced number of birds ☺ Confined the birds ☺ Vaccination ☺  
 Slaughtered sick animals ☺ Nothing ☺ Other .....

**D.40** (To indicate the reliability of the answers given by the person interviewed).  
 Excellent ☺ Good ☺ Medium ☺ Bad ☺ Very bad ☺