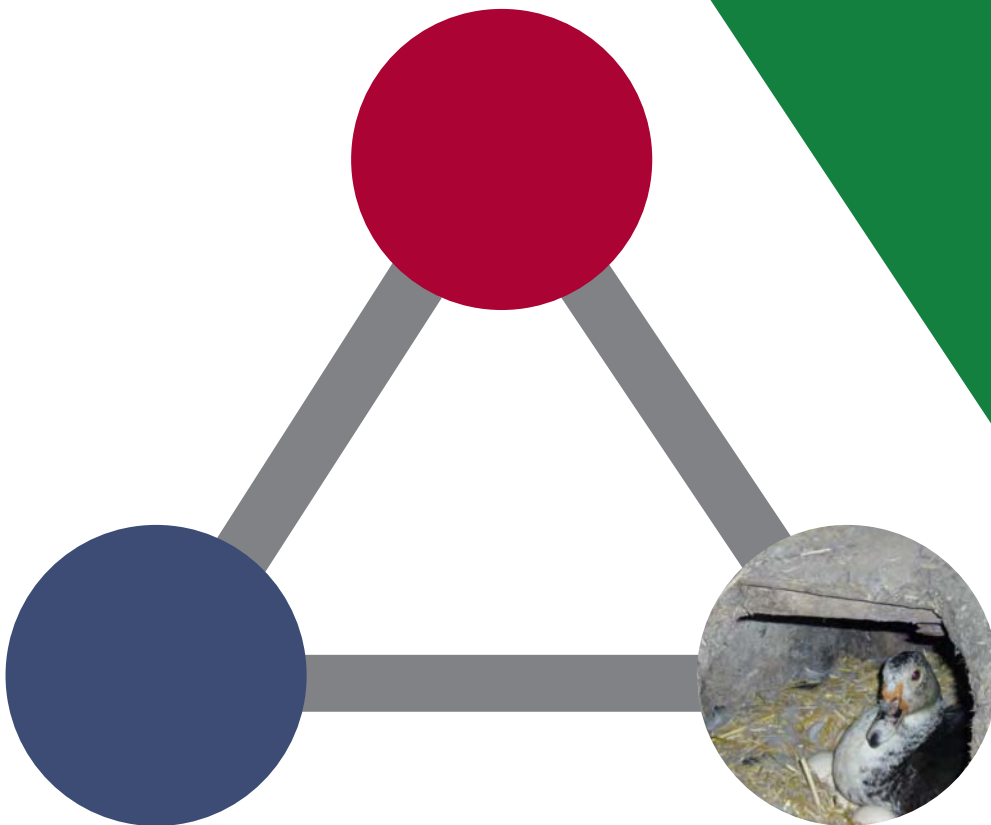


Characterization of domestic chicken and duck production systems in Egypt



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RECOMMENDED CITATION

FAO. 2009. Characterization of domestic chicken and duck production systems in Egypt. Prepared by Haitham M. Yakout, Mohamed Kosba and Olaf Thieme. *AHBL - Promoting strategies for prevention and control of HPAI*. Rome.

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Acronyms

Co-PI	project executive manager
EPASA	Egyptian Poultry Science Association
GPS	global positioning system
HH	household
ILRI	International Livestock Research Institute
MDG	Millennium Development Goal
PI	project leader



Introduction and purpose

The project aimed to study the characterization traits of Baladi chickens and ducks, and to survey village poultry production systems in three governorates of Egypt – Gharbia, Fayoum and Sohag – through qualitative research, including focus group discussions, and using rapid rural appraisal tools.

The original plan was to collect data from the numbers of villages, households, chickens and ducks shown in Table 1. However, this proved impossible, and the actual numbers sampled and surveyed in each of the three governorates are shown in Table 2.

Table 1 The original plan

Governorate	No. villages	Households surveyed	Chickens for phenotypic characterization	Ducks for phenotypic characterization	Blood samples, chickens	Blood samples, ducks
Gharbia	30	120 + 30	600	150	90	30
Fayoum	30	120 + 30	600	150	90	30
Sohag	30	120 + 30	600	150	90	30
Other	10	40 + 10	200	50	30	10
Total	100	400 + 100	2 000	500	300	100

Table 2 Actual numbers of villages, households, chickens and ducks surveyed

Governorate	Markazes	No. villages	Households/ village	Households surveyed	Blood samples, chickens	Blood samples, ducks
Gharbia	8	27	5-12	212	153	51
Fayoum	6	27	5-12	214	153	51
Sohag	11	26	5-12	211	153	51
Total		80		637	469	153

Justification for changes

Number of villages: When the research team members started to put the original plan into practice, they found it difficult to find 30 appropriate villages in each governorate. They therefore reduced the number of villages per governorate without affecting the overall sample size. In addition, there were not enough provinces in each surveyed governorate to allow data collection from only one village per province. This occurred in Fayoum, for example, where there are only six provinces, so data were collected from two villages in each province.

Sample numbers for the other parameters were changed to bring them into line with the overall numbers in the original plan.

An equal number of villages were surveyed in each governorate. The populations of both chickens and ducks are similar in the three governorates, so the numbers of samples and interviews were also equal, but the number of households in each village could vary, depending on the size of the village.

Phenotypic and production data were to be collected from 12 households in each village, and from five birds in each household (one male and four females). All blood samples and data on phenotypic traits are from adult birds.

The blood samples in each village are from households (nine samples for chickens and three for ducks) that are as far from each other as possible; the samples from each household include one sample from a rooster, whenever possible. The phenotypic/production



characterization included photographing the birds that were sampled for blood, and the production conditions in which they are kept, and labelling the photos carefully.

Materials and methods

The field data collection was carried out in two phases:

Work plan (phase I):

- August 2008
- Three governorates
- 12 villages in each government
- 12 households in each village

Work plan (phase II):

- October-November 2008
- Three governorates
- 15 villages in each government
- Five households in each village

The activities included the following steps:

- Households were selected to be as far from each other as possible
- When possible, a woman was included in the survey team, to facilitate communications with female farmers in the villages.
- A schedule of possible villages to be surveyed was drawn up for each governorate.
- A team leaders' meeting with the Alexandria team and the national coordinator was planned.
- No field activities were carried out in September, because it would have been difficult to conduct fieldwork during Ramadan.
- Work continued after Ramadan, when new villages were identified and visits to them prepared.
- The Alexandria survey team was present during some of the later field activities, to assist teams in carrying out their field activities.

Activities and timetable

Conducting the survey

The survey was guided by FAO and carried out by the Egyptian Poultry Science Association (EPSA).

The first task was to identify and appoint the team members for data collection in the field. A team of four – two data collectors and two support staff, including a driver – was appointed for each governorate. The Sohag team was led by Dr Zeinhom Shykhon, the Gharbia team by Dr Tarek Amin Ebead, and the Fayoum team by Dr Aly Abd El-Azeem.

Extension units were then consulted to help identify the villages to be surveyed in each governorate, in coordination with local authorities.

In Gharbia, eight markazes were surveyed: Sunta, where the villages surveyed were Gemiza, Meet Haway, Gemiza and Tokh Mezed; Tanta where the villages were Meet Hasheesh and Kafr El-Sheekh Seleem; Kafr El-Zayaat, where Kafr Halawy and Dlebshan were surveyed;



Bassyon, where the village was Kafr Soliman; Zefty, where Shershaba was surveyed; Kotoor, with Amyout village; Al-Mahalaah, with Mahalat Hasan village: and Samannud

In Fayoum, the markazes of Fayoum, Snores, Tamyia, Atha, Eb Shway and Yousef Al Sedeek were surveyed.

In Sohag, the survey covered 11 markazes and the villages of Edfa, Al Gemiza, Al Khyam, Seflak, Al Swamaa East, Slamon, Berkheel, Nage Khalifa, Al Dyeea, Kom Badar and Tahta. The location of the surveyed locations is shown by Figure 1.

Figure 1 Location of the surveyed poultry producers



In May/June 2008, a training course was organized for all the researchers, data reviewers, data entry people and supervisors from EPSA. Researchers were supplied with stationery and were trained in the use of the equipment to be used during field visits, such as:

- global positioning systems (GPS);
- digital cameras;
- digital scales;
- blood sampling kits including:
 - filter paper: 150 sheets/governorate;
 - needles for blood sampling: 200/governorate.

The authors are indebted to Dr Zahra Ahmed, National Coordinator, FAO ECTAD - Cairo, for her valuable support at the operational field level all through the study. This included translating and transposing the study instruments to suit the local language and culture, training of the data collectors, and establishing a system for quality control of the collected data. The set of remedial measures proposed by Dr Zahra contributed to improving the outcome of the survey.

Photo 1 Recording of body weight and shank length

To compensate for their time and effort and for the stress on their birds, farmers who participated in the survey were each to receive 5 kg of feed, for a total of 12 farmers per village.

The next task was to organize the overall field plan and implementation of field activities during the survey. The blood sampling processes involved carrying out the sampling, storing the samples, and sending the samples to the FAO National Project Coordinator. Phenotypic characterization (photos) and communication means were organized, as were overnight facilities for the researchers, when necessary.

Then the questionnaires and the methodology for blood sampling were developed and pre-tested. This was followed by a day of top-up training for the researchers. The questionnaires were translated from English into Arabic and distributed to team leaders, who were given the opportunity of going through them step by step to make sure that they understood all the points to be covered. The need to fill in all items on the questionnaires was emphasized.

Two supervisors (a project leader and a project executive manager) and an assistant were then identified to act as focal points responsible for monitoring the researchers' work according to the timetable, and for the administrative/logistics aspects of data collection. Supervisors had to be fluent in written and spoken English, and kept the FAO Project Coordinator updated and informed on the data collection, as well as organizing her visits to the data collectors. Dr Mohamed A. Kosba was appointed project leader, and Dr Haitham M. Yakout project executive manager. Both are with the Faculty of Agriculture at Alexandria University.

The supervisors were also responsible for initial quality control of the data collected by researchers. Data collections covered:

- Blood sampling
- Phenotypic characterization of birds (using photos)
- Interviews about the production systems used by poultry farmers
- The data were then entered into an electronic data format, using pre-designed data matrices and tables in Arabic. Data entry was carried out concurrently with data collection. The computerized data collected was then analysed by EPSA.
- Supervisors worked closely with the FAO National Project Coordinator responsible for overseeing the research activities, and met her regularly to discuss major issues,

findings, observations and obstacles. This involved several meetings at FAO-Egypt in Cairo:

- An initial meeting with the project leader (PI), the project executive manager (Co-PI) and the National Project Coordinator to set up a general fieldwork frame;
- A follow-up meeting involving the same people, to fine-tune the work plan and activities;
- A progress meeting to review the translated questionnaires;
- Periodic communications involving the same people, plus the programme operations officer and the livestock development officer, to deal with obstacles and ease the planning process for starting the pre-field phase.

Blood sampling

The blood sampling processes involved collecting samples, storing them and sending them to the FAO National Project Coordinator. Blood samples with codes and identification were then sent to the International Livestock Research Institute (ILRI) in Kenya for further DNA analysis. Annex 1 describes the procedure for blood sampling.

As well as the birds in the survey, samples were also taken from Egyptian standard poultry breeds. This took about eight weeks to survey as many Egyptian breeds, in as many different farms and locations as possible. Work started in March 2009 and finished at the end of April 2009. The blood samples from these birds were also coded and sent to ILRI for DNA analysis.

Photo 2 Taking blood samples



Questionnaires

The original questionnaires were revised during a workshop in October 2008 at FAO, where all the survey team members received follow-up training in preparation for the second phase of the fieldwork. The revised questionnaires used during this second phase are reproduced in Annexes 2, 3 and 4.

The changes made to the original questionnaires from FAO reflected the parameters that vary from one country to another, including education level, owning/renting of land, and land

area held. These parameters were adapted to match the socio-economic and cultural situation of Egyptian poultry farmers.

Field photography

Table 3 shows the numbers of photos taken of chickens and ducks in each village. Figures in brackets refer to the proposed number in the original project plan.

Table 3 Photos of chickens and ducks taken

Province	No. villages	Photos of chickens	Photos of ducks
Gharbia	27 (30)	1 095 (600)	555 (150)
Fayoum	27(30)	1 095 (600)	555 (150)
Sohag	27 (30)	1 095 (600)	555 (150)
Other	(10)	(200)	(50)
Total	81 (100)	3 285 (2 000)	1 665 (500)

Photo 3 Taking individual pictures of birds



Gender and age structure

Table 4 shows the numbers of women and men interviewed in the three Governorates and their average ages.

Table 4 Structure of the interviewed poultry producers

Province	Women		Men	
	No	Average Age (Years)	No	Average Age (Years)
Gharbia	202	43.7	10	45.8
Fayoum	75	39.4	139	20.1
Sohag	40	49.8	171	36.2
Total	317	43.4	320	29.5

Discussion of results

Production systems

The poultry sector is considered the fastest growing and flexible of all the livestock sectors. Over the past decade, its dramatic expansion, consolidation and globalization have been driven by very strong demand (McLeod *et al.*, 2009). Village poultry makes a significant contribution to poverty alleviation and household food security in many developing countries (Alders *et al.*, 2009). For example, impact studies have shown that the income generated from selling eggs in South Asia is used to educate children and begin the process of asset accumulation.

Eggs are a particularly important source of nutrition, containing approximately 315 kJ of digestible energy. They are also one of the best sources of quality protein, and provide a broad spectrum of vitamins, such as A, B₁₂ and K (a bone-boosting nutrient that is also involved in blood coagulation), as well as choline. Another of their advantages is that eggs can be stored for several days under normal village conditions and require very little energy or time to cook. In addition, sales of eggs and poultry products generate cash that can be invested in other livestock, such as goats, cattle, increased poultry production or other businesses (Alders and Harun, 2004).

Survey results from the three governorates revealed that farming households' access to communications technology was notable. About 42 percent of them have access to radio and 95 percent to TV, while 87 percent of households overall – rising to 100 percent in Gharbia – have mobile phones (Table 5). This reflects a high level of technological knowledge in these areas.

However, this finding is not related to the education levels of household heads (Table 7), as 37 percent of them have never attended school. Furthermore, 27 percent have only primary education, especially in Fayoum and Sohag, where the figures are 35 and 29 percent respectively.

About 61 percent of the households have between one and five members, with Sohag having the highest proportion in this category, at 75 percent, followed by Fayoum with 74 percent, and Gharbia with 62 percent. Larger households with more than nine members accounted for only 2 percent overall, and only 0.95 percent in Sohag (Table 7). A large proportion (40 percent) of households does not own land; 25 percent own less than 0.3 ha, rising to 28 percent in Fayoum. About 24 percent own between 0.3 and 1 ha, especially in Sohag (Table 6), which also showed a higher proportion of households renting land, at 42 percent (Table 5).

The survey divided main crops into winter and summer crops (Tables 9 to 13), as a distinguishing feature of Egyptian cultivation systems is that they allow farmers to plant their fields twice, and in some areas three times, a year. Maize was reported as the main summer crop for 43 percent, mainly in Gharbia, followed by Berseem for 24 percent, rising to 69 percent in Sohag. Maize is the second most important summer crop for 34 percent of households, followed by rice for 15 percent; in Sohag maize is the second most important crop for 63 percent. The third most important summer crop is Berseem, for 16 percent of households, mainly in Sohag with 68 percent, followed by rice for 7 percent, mainly in Gharbia with 30 percent. Among winter crops, wheat is the most important for 80 percent, mainly in Fayoum with 93 percent and Sohag with 98.5 percent. Berseem is the second most important winter crop for 85 percent, mainly in Fayoum with 91 percent and Sohag with 92 percent. Beans are the third most important winter crop for 51 percent, mainly in Sohag with 74 percent. Wheat follows beans, with 12 percent of households overall, mainly in Fayoum with 39 percent and Gharbia with 33 percent.



Production systems traits

Table 5 Use of radios, TVs, telephones/mobile phones and land among the survey households (percentages)

Governorate	Radio use		TV watching		Phone/ mobile access		Use of agricultural land	
	N	Yes	N	Yes	N	Yes	N	Yes
Gharbia	210	36.2	75	100	212	100	211	32.2
Fayoum	206	43.5	73	86.3	205	64.8	213	22.5
Sohag	191	46.5	74	98.7	208	96.6	211	50.7
Total	607	41.9	222	95.2	625	87.3	635	35.1

Table 6 Size of households' landholdings (percentages)

Governorate	N	Households					
		None	< 0.3 ha	0.3–1 ha	1–5 ha	5–10 ha	> 10 ha
Gharbia	186	47.9	22.6	15.6	12.9	0.5	0.0
Fayoum	192	56.8	27.6	12.5	2.6	0.5	0.0
Sohag	195	15.5	24.5	42.5	12.1	3.9	1.4
Total	573	39.8	24.9	23.7	9.2	1.7	0.5

Table 7 Education of household head and size of household (percentages)

Governorate	Education of HH head					No. of HH members				
	N	None	Prim. school	Sec. school	High school	N	1–5	6–7	8–9	> 9
Gharbia	192	48.8	17.2	21.4	13.0	202	61.9	32.2	4.0	2.0
Fayoum	203	39.8	35.0	26.5	0.0	201	74.1	17.4	5.0	3.5
Sohag	211	23.7	28.9	34.1	13.3	211	74.9	21.8	2.4	1.0
Total	606	37.0	27.2	27.5	8.7	614	70.4	23.8	3.7	2.1

Table 8 Most important summer crop of households (percentages)

Governorate	Phase II	N	Main crop 1 (summer)*						
			Berseem	Sugar cane	Grape	Maize	Rice	Tomato	Veg
Gharbia		40	2.5	-	37.5	20.0	40.0	-	-
Fayoum		55	0.0	1.8	-	80.0	9.1	7.3	1.8
Sohag		62	69.4	1.6	-	29.0	-	-	-
Total		157	24.0	1.2	12.5	43.0	16.4	2.4	0.6

* Summer/Winter crop classification was applied during phase II fieldwork only.

Table 9 Most important winter crop of households (percentages)

Governorate	Phase II	N	Main crop 1 (winter)*				
			Berseem	Wheat	Sugar cane	Onion	Maize
Gharbia		25	42.3	50.0	0.0	3.9	0.0
Fayoum		55	1.8	92.7	0.0	1.8	3.6
Sohag		62	0.0	98.4	1.6	0.0	0.0
Total		142	14.7	80.4	0.5	1.9	1.2

*Summer/Winter crop classification was applied during phase II fieldwork only.



Table 10 Second most important summer crop of households (percentages)

Crops	Governorates Phase I+II			
	Gharbia	Fayoum	Sohag	Total
Maize	33.3	35.2	62.6	40.7
Vegetable	0	35.9	0	18.7
Wheat	50	0	0	12.9
Olive	0	13.8	0	7.2
Tomato	0	9.7	0	5.0
Sugar cane	0	0.7	19.7	4.7
Rice	8.3	4.1	0	4.3
Berseem	1.4	0	17.6	4.2
Cotton	4.2	0	0	1.1
Onion	1.4	0	0	0.4
Bean	0	0	0.1	0
N	72	145	61	278

Table 11 Second most important winter crop of households (percentages)

Governorate Phase II	Main crop 2 (winter)					
	N	Berseem	Wheat	Maize	Cotton	Bean
Gharbia	17	41.8	35.3	5.9	11.8	5.9
Fayoum	54	90.7	3.7	1.7	0.0	0.0
Sohag	62	91.9	3.2	0.0	0.0	4.8
Total	133	85.0	7.5	1.4	1.5	3.0

Table 12 Third most important summer crop of households (percentages)

Crops	Governorates Phase I+II			
	Gharbia	Fayoum	Sohag	Total
Berseem	21.3	14.3	68.4	32.9
Rice	29.8	0.0	0.0	15.6
Maize	25.6	0.0	4.1	14.5
Tomato	0.0	57.1	0.0	11.6
Cotton	12.0	7.1	0.0	7.7
Peanut	0.0	0.0	26.3	7.2
Vegetable	0.0	21.3	0.0	4.3
Wheat	7.0	0.0	0.0	3.7
Onion	2.1	0.0	0.0	1.1
Grape	2.1	0.0	0.0	1.1
Bean	0.0	0.0	0.6	0.2
Sugar cane	0.0	0.0	0.6	0.2
N	36	14	19	69



Table 13 Third most important winter crop of households (percentages)

Governorate Phase II	Main crop 3 (winter)*								
	N	Berseem	Wheat	Maize	Cabbage	Bean	Rice	Finger reek	Vegetable
Gharbia	3	0	33.3	5.9	0	0	66.7	0	0
Fayoum	9	5.6	38.9	0	33.3	0	0	0	22.2
Sohag	27	14.8	0	1.7	0	74.1	0	11.1	0
Total	39	11.5	11.5	1.6	7.7	51.3	5.1	7.7	5.1

*Summer/Winter crop classification was applied during phase II fieldwork only.

Table 14 presents the findings regarding large livestock and its importance in households' income. Overall, 73 percent of households use large animals mainly for home consumption, ranging from 92 percent in Sohag to 32 percent in Fayoum, where farmers tend to use large animals for selling products. For 44 percent of the households overall, large animals are of the greatest importance; this is the case more than 70 percent of households in Gharbia and Fayoum, but for only 16 percent in Sohag, probably because farmers in Sohag have very low incomes and can seldom afford to own cattle or buffaloes.

Table 15 shows the findings regarding households' small ruminants. Overall, 71 percent of households use small ruminants for home consumption, with the highest incidence, of 86 percent, in Gharbia. Small ruminants are of the greatest importance to 21 percent of households overall, rising to 69 percent in Gharbia.

Chickens (Table 16) are used mainly for home consumption in 86 percent of households overall, rising to 99 percent in Sohag, followed by 94 percent in Gharbia. Ducks (Table 17) follow a similar pattern to that of chickens and small ruminants, as they too are used mainly for home consumption in 85 percent of households overall. They are a high priority for 92 percent of households in Sohag, and of the highest priority for 90 percent in Gharbia.

Overall 37 percent of the surveyed poultry owners keep cattle and 47 percent buffaloes, the proportions being highest for both species in Sohaq. The average number of cattle and buffaloes kept by each owner in the three Governorates was 3.2 cattle and 2.3 buffaloes (Table 18).

Of the surveyed households 30 percent keep sheep and 19 percent goats with average numbers of 7.4 sheep and 3.1 goats. Sheep have similar importance in Fayoum and Sohaq but both sheep and goats are kept by few surveyed households and small numbers in Gharbia (Table 19).

The proportions of the surveyed households with local and improved type chickens were 68 percent and 30 percent, respectively and the corresponding figures for ducks were 75 percent and 28 percent (Tables 20 and 21). There were no producers with either improved chickens or ducks in Sohaq, but for both species almost half of those in Fayoum kept improved types. The ownership of chickens and ducks seems to be equally common except for Sohaq where a larger proportion of households keep ducks than chickens. The total numbers of local type birds kept by the surveyed households ranged for chickens from 22 in Gharbia to 32 in Sohaq and for ducks from 17 in Fayoum to 20 in Sohaq. The average numbers for both species was thus highest in Sohaq. The numbers of improved chickens and ducks kept by the surveyed households was more than double in Fayoum than in Gharbia (Table 21).



Table 14 Main use and importance of large ruminants for households (percentages)

Governorate	Main use of large ruminants				Importance for family					
	N	Market	Home consum.	Both	N	Lowest	Low	Medium	High	Highest
Gharbia	48	10.4	83.3	6.3	41	9.8	0.0	0.0	0.0	90.2
Fayoum	83	27.7	32.5	39.8	83	3.6	7.2	2.4	15.7	71.1
Sohag	153	3.9	92.2	3.9	153	0.0	0.0	5.9	77.8	16.3
Total	284	12.0	73.2	14.8	277	2.5	2.2	4.0	47.7	43.7

Table 15 Main use and importance of small ruminants for households (percentages)

Governorate	Main use of small ruminants				Importance for family					
	N	Market	Home consum.	Both	N	Lowest	Low	Medium	High	Highest
Gharbia	22	9.1	86.4	4.5	16	12.5	0.0	12.5	6.3	68.8
Fayoum	115	7.8	70.4	21.7	115	4.3	19.1	32.2	27.8	16.5
Sohag	13	38.5	53.8	7.7	13	0.0	0.0	76.9	23.1	0.0
Total	150	10.7	71.3	18.0	144	4.9	15.3	34.0	25.0	20.8

Table 16 Main use and importance of chickens for households (percentages)

Governorate	Main use of chickens				Importance for family					
	N	Market	Home consum.	Both	N	Lowest	Low	Medium	High	Highest
Gharbia	195	0.0	94.4	5.6	72	0.0	0.0	5.6	4.2	90.3
Fayoum	213	0.9	65.7	33.3	207	11.6	5.8	20.8	33.8	28.0
Sohag	208	0.0	99.0	1.0	208	0.5	0.5	2.9	88.5	7.7
Total	616	0.3	86.0	13.6	487	5.1	2.7	10.9	52.8	28.5

Table 17 Main use and importance of ducks for households (percentages)

Governorate	Main use of chickens				Importance for family					
	N	Market	Home consum.	Both	N	Lowest	Low	Medium	High	Highest
Gharbia	186	0.0	94.6	5.4	69	0.0	1.4	5.8	2.9	89.9
Fayoum	179	3.9	60.9	35.2	175	17.1	11.4	25.1	28.6	17.7
Sohag	186	0.0	98.9	1.1	186	0.5	0.5	3.2	91.9	3.8
Total	551	1.3	85.1	13.6	430	7.2	5.1	12.6	51.9	23.3

Table 18 Average numbers of cattle and buffaloes owned by households

Governorate	Cattle						Buffaloes					
	N	Calves	Female		Male		N	Calves	Female		Male	
			< 2 years	> 2 years	< 2 years	> 2 years			< 2 years	> 2 years		
Gharbia	61	0.11	0.16	1.83	0.14	0.52	103	0.05	0.05	1.54	0.03	0.28
Fayoum	64	1.03	1.42	0.63	0.41	0.06	61	0.90	1.03	0.62	0.23	0.23
Sohag	111	0.96	0.41	1.41	0.15	0.37	135	0.62	0.36	1.03	0.10	0.08
Total	236	0.77	0.63	1.30	0.22	0.32	299	0.60	0.49	1.01	0.12	0.15



Table 19 Average numbers of sheep and goats owned by households

Governorate	Sheep						Goats					
	N	Lambs	Female		Male		N	Kids	Female		Male	
			< 2 years	> 2 years	< 2 years	> 2 years			< 2 years	> 2 years	< 2 years	> 2 years
Gharbia	18	0.00	0.41	1.44	0.39	0.22	19	0.00	0.13	2.50	0.13	1.00
Fayoum	84	0.99	0.60	0.24	0.29	0.08	81	1.20	0.62	0.28	0.25	0.06
Sohag	87	4.47	2.72	5.21	0.31	0.68	24	2.50	0.63	1.54	0.13	0.08
Total	189	2.53	1.56	2.64	0.31	0.37	124	1.30	0.55	0.83	0.21	0.19

Table 20 Average numbers of local chickens and ducks owned by households

Governorate	Chickens							All
	N	Chicks	Female		Male			
			2–6 months	> 6 months	2–6 months	> 6 months		
Gharbia	209	3.0	1.4	14.1	0.5	2.5	21.5	
Fayoum	143	12.0	6.2	5.9	2.9	0.6	27.6	
Sohag	82	8.7	7.9	13.8	0.1	0.9	31.5	
Total	434	7.1	4.2	11.4	1.2	1.5	25.4	
Governorate	Ducks							All
	N	Duckl.	Female		Male			
			2–6 months	> 6 months	2–6 months	> 6 months		
Gharbia	177	1.1	2.0	12.4	0.5	2.8	18.8	
Fayoum	120	8.1	3.6	2.3	2.1	0.6	16.7	
Sohag	179	12.6	4.4	2.5	0.1	0.8	20.4	
Total	476	7.2	3.3	6.1	0.8	1.5	18.9	

Table 21 Average number of improved chickens and ducks owned by households

Governorate	Chickens							All
	N	Chicks	Female		Male			
			2–6 months	> 6 months	2–6 months	> 6 months		
Gharbia	81	3.57	0.1	4.9	0.4	6.0	14.9	
Fayoum	108	13.6	8.2	7.5	1.5	1.1	32.0	
Sohag	0						0	
Total	189	13.0	7.7	7.3	1.4	1.4	30.9	
Governorate	Ducks							All
	N	Duckl.	Female		Male			
			2–6 months	> 6 months	2–6 months	> 6 months		
Gharbia	76	0.0	0.0	4.0	0.0	1.0	5.0	
Fayoum	100	5.9	4.5	3.3	0.5	0.8	14.9	
Sohag	0						0	
Total	176	5.8	4.4	3.3	0.5	0.8	14.8	



Chicken flock numbers decreased over the last five years for 58 percent of households, with the highest proportion in Gharbia, of 88 percent. According to survey respondents, this reduction started with the AI outbreak in February 2006, and they had kept larger chicken and duck flocks prior to that date (Table 22). Seasonal flock changes (Table 23) were reported by 64 percent of households for chickens and 15 percent for ducks. Gharbia has the highest proportion of seasonal change in flocks, for 99 percent of both chicken and duck farmers.

Poultry numbers are at their highest (Table 24) in winter for 53 percent of households overall, but among governorates this ranges from 52 percent in Gharbia, to 20 percent in Fayoum and to 79 percent in Sohag. Summer is the season when poultry numbers are at their lowest (Table 25) for 46 percent of households, rising to 64 percent in Sohag, where higher summer temperatures cause increased poultry mortality.

Table 22 Changes in the sizes of households' chicken flocks over the past five years (percentages)

Governorate	N	Change in chicken flock size		
		No change	Increased	Decreased
Gharbia	211	5.2	7.1	87.7
Fayoum	213	21.6	54.0	24.4
Sohag	211	17.1	20.4	62.6
Total	635	14.6	27.2	58.1

Table 23 Seasonal changes in the sizes of households' chicken and duck flocks (percentages of respondents)

Governorate	Chicken			Duck		
	N	Yes	No	N	Yes	No
Gharbia	208	98.6	1.4	201	99.0	1.0
Fayoum	213	73.7	26.3	198	70.2	29.8
Sohag	211	20.9	79.2	201	14.0	86.0
Total	632	64.3	35.7	600	15.3	84.7

Table 24 Seasons when households' poultry numbers are at their highest (percentages of respondents)

Governorate	N*	Winter	Spring	Summer	Autumn
Gharbia	648	51.9	3.4	8.3	36.5
Fayoum	341	20.0	37.6	40.3	2.1
Sohag	211	78.2	0.0	21.8	0.0
Total	1200	53.4	13.6	21.2	11.9

* Multiple answers included



Table 25 Seasons when households' poultry numbers are at their lowest (percentages of respondents)

Governorate	N	Winter	Spring	Summer	Autumn
Gharbia	118	3.2	63.4	30.1	3.2
Fayoum	331	44.2	6.6	40.1	9.1
Sohag	211	21.9	14.9	63.6	0.0
Total	660	29.7	19.4	45.8	5.1

Most (97 percent) of the survey households buy birds (Table 26). In Fayoum, this rises to more than 99 percent, probably because several poultry research stations in this area are carrying out work to improve poultry strains. Overall, 60 percent buy local breeds, especially in Gharbia with 98 percent (Table 27). Most households do not buy improved strains or old birds, with overall figures of 94 and 99 percent respectively for these parameters. The criteria households use when buying birds include none for 16 percent, number of eggs laid for 19 percent colour of eggs for 12 percent, good mothering qualities for 15 percent, and colour or pattern of plumage for 31 percent (Table 28). Overall, 63 percent hatch their own eggs, especially in Gharbia with 85 percent, and 64 percent buy eggs, again, especially in Gharbia with 90 percent. Overall, 57 percent of households try to obtain better birds, especially in Sohag with 62 percent (Table 29). New birds for households' flocks are bought mainly from the market, for 34 percent overall, rising to 54 percent in Gharbia, or from other sources, for 29 percent, especially in Sohag with 69 percent (Table 30).

Overall, only 0.6 percent of farmers have no special criteria for selecting the birds they buy for improving their flocks; all of these farmers are in Gharbia and Sohag (Table 31). For the others, selection is based on the bird's ability to live independently for 45 percent, the number of eggs laid for 22 percent, the colour of eggs for 18 percent, the taste of the meat for 31 percent, and the bird's mothering qualities for 25 percent.

Table 26 Sources of birds for households (percentages)

Governorate	Do you buy birds?		If so, where from?			
	N	Yes	Market	Neighbours	Comm. poultry farm	Other
Gharbia	211	93.1	67.1	0.0	22.3	1.6
Fayoum	213	99.6	51.6	9.4	13.7	25.3
Sohag	211	98.2	50.0	3.2	18.8	28.0
Total	635	97.0	59.2	4.2	18.3	18.3

Table 27 Types of birds bought by households (percentages)

Governorate	N	Type of birds bought			
		Local breed	Improved strain	Young birds	Adult birds
Gharbia	203	97.5	4.9	1.0	0.0
Fayoum	212	79.0	12.8	12.0	0.9
Sohag	208	5.3	0.0	95.2	1.0
Total	623	60.4	5.9	36.2	0.6



Table 28 Criteria households use for selecting the birds that they buy (percentages)

Governorate	Criterion used for selection										
	N	1	2	3	4	5	6	7	8	9	10
Gharbia	188	1.6	87.2	90.0	35.9	23.2	9.0	21.2	38.7	17.4	27.3
Fayoum	212	36.3	91.8	88.8	45.7	16.4	19.3	17.4	58.7	30.9	67.6
Sohag	209	10.2	100	100	54.5	18.9	7.6	47.4	73.5	0.5	0.0
Total	609	15.9	89.4	93.1	44.8	19.2	12.1	28.9	57.3	15.8	31.2

1 = none; 2 = size/weight; 3 = longevity; 4 = ability to live independently; 5 = number of eggs laid; 6 = colour of eggs; 7 = taste of meat; 8 = disease resistance; 9 = good brooding qualities; 10 = colour of plumage.

Table 29 Households' hatching and purchase of eggs to try to obtain better birds (percentages)

Governorate	Hatch eggs?		Buy eggs?		Try to obtain better birds	
	N	%	N	%	N	%
Gharbia	212	85.3	137	90.5	233	50.4
Fayoum	213	65.9	139	64.0	239	57.3
Sohag	211	36.6	137	36.7	216	62.5
Total	636	62.6	413	63.7	688	56.6

Table 30 Sources of better birds for households (percentages)

Governorate	Source of better birds					
	N	Own flock	Neighbours	Market	Commercial poultry farm	Other
Gharbia	186	8.1	34.8	53.8	3.1	0.5
Fayoum	261	6.9	8.8	46.0	12.7	12.6
Sohag	233	0.0	3.4	5.6	13.2	69.1
Total	680	4.9	14.1	34.3	10.2	28.7

Table 31 Households' criteria for selecting birds from own flock for breeding (percentages)

Governorate	Selection criterion for breeding										
	N	1	2	3	4	5	6	7	8	9	10
Gharbia	203	1.0	84.7	94.2	21.1	12.8	8.4	27.5	22.9	34.1	31.6
Fayoum	212	0.0	95.3	93.9	60.1	27.5	37.0	20.9	59.6	41.5	73.6
Sohag	211	0.9	99.1	64.0	55.5	25.6	9.9	43.6	67.4	0.5	0.0
Total	626	0.6	93.1	83.9	45.5	21.9	18.4	30.6	49.9	25.1	34.8

1 = none; 2 = size/weight; 3 = longevity; 4 = ability to live independently; 5 = number of eggs laid; 6 = colour of eggs; 7 = taste of meat; 8 = disease resistance; 9 = good brooding qualities; 10 = colour of plumage.

Housing and manure disposal results are shown in Table 32. Overall, 76 percent house their birds day and night, rising to 94 percent in Sohag, probably because of the weather conditions in that governorate. Manure is used as a fertilizer by 64 percent of households, especially in Gharbia, with 93 percent.

Nearly all the surveyed households provide feed for their birds; 78 percent purchase it, especially in Gharbia and Fayoum, and 81 percent of these farmers purchase concentrate feed, mainly in Gharbia with nearly 100 percent (Table 33).



As shown in Table 34, 30 percent of all households purchase all of the feed they provide, especially in Gharbia with 67 percent; 28 percent purchase 75 percent, rising to 39 percent in Fayoum; and 27 percent purchase 50 percent, especially in Sohag with 53 percent (Table 34).

Overall, 79 percent of households do not sell their birds, and 65 percent do not sell eggs (Table 35). About 82 percent do not vaccinate their birds, but 59 percent use veterinary services. Regarding sales of birds, 39 percent, mainly in Sohag, sell to traders who come to the village to purchase and sell young birds as a source of income. For 43 percent of households, eggs are sold to neighbours, especially in Fayoum with 59 percent (Table 36).

Table 32 Bird housing and manure disposal by households (percentages)

Governorate	Housing					Manure disposal				
	Day & night	Night only	Type of housing			A	B	C	D	E
			1	2	3					
Gharbia	53.0	82.7	6.7	91.3	2.0	1.2	1.2	93.2	3.0	1.4
Fayoum	79.9	50.0	65.2	33.1	1.7	26.2	5.4	38.3	9.2	20.9
Sohag	94.2	99.3	51.8	48.2	0.0	33.1	0.0	60.8	1.5	4.6
Total	75.7	77.3	41.2	57.5	1.2	20.2	2.2	64.1	4.6	8.0

Housing: 1 = simple construction with on-farm materials; 2 = simple construction with purchased materials; 3 = improved construction (disease vector control, climate control, etc.). Manure disposal: A = none; B = feed to other animals; C = use as fertilizer; D = sell; E = other.

Table 33 Households' feed purchases, and types and sources of feed (percentages)

Governorate	N	Provide feed to birds	Purchase feed for birds	Type of feed provided			Source of purchased feed			
				1*	2*	3*	N	Market	Neighbours	Other
Gharbia	212	100	98.2	99.5	0.4	0.0	209	99.1	0.5	0.5
Fayoum	213	100	99.6	61.7	35.4	2.9	225	64.4	34.2	1.3
Sohag	211	99.5	35.6	70.9	1.1	28.0	79	32.9	44.3	22.8
Total	636	99.8	77.9	77.4	12.3	10.3	513	73.7	22.0	4.3

*1 = purchased concentrate; 2 = concentrate produced on own farm (grains); 3 = other.

Table 34 Proportion of feed provided by households that is purchased (percentages)

Governorate	N	0%	25%	50%	75%	100%
Gharbia	212	0.5	0.5	3.8	28.3	67.0
Fayoum	233	1.7	14.2	31.5	38.9	13.8
Sohag	158	12.9	20.0	52.9	11.5	2.6
Total	603	4.2	10.9	27.4	28.0	29.5



Table 35 Households' sales of birds and eggs, vaccination of birds and use of veterinary services for birds

Governorate	N	Sell birds	Sell eggs	Vaccinate birds	Use veterinary services for birds
Gharbia	212	5.3	36.8	3.3	97.6
Fayoum	212	51.4	58.0	29.0	51.3
Sohag	211	5.4	10.4	21.8	22.2
Total	635	20.7	35.1	18.0	59.3

Table 36 Households' sales of birds and eggs (percentages)

Governorate	Birds are sold to					Eggs sold to				
	1	2	3	4	5	1	2	3	4	5
Gharbia	28.5	50.0	14.3	7.1	0.0	53.0	8.3	33.3	8.3	0.0
Fayoum	35.2	25.4	23.8	15.5	0.0	59.0	33.4	31.4	4.8	3.9
Sohag	0.0	0.0	0.0	95.0	5.0	16.0	35.0	0.0	5.0	50.00
Total	21.2	25.1	12.7	39.2	1.7	42.7	25.6	21.5	6.0	17.9

1: Neighbours, 2: Market < 10km away, 3: Market > 10 km away, 4: Traders coming to village, 5: Other

Most of the farmers interviewed (about 72 percent) reported that it is their partner who is responsible for the birds, including feeding and housing. Partners are also responsible for selling eggs in 55 percent of : Neighbours, 2: Market < 10km away, 3: Market > 10 km away, 4: Traders coming to village, 5: Other cases (rising to 100 percent in Sohag), and for selling birds in 72 percent (Tables 37 to 41).



Table 37 Who is responsible for the birds? (percentages)

Governorate	N	Respondent	Partner	Children	Other family member	Hired labour
Gharbia	280	7.1	74.3	18.6	0.0	0.0
Fayoum	267	30.3	46.1	12.7	10.9	0.0
Sohag	211	0.0	100	0.0	0.0	0.0
Total	758	13.3	71.5	11.3	3.8	0.0

Table 38 Who is responsible for feeding the birds? (percentages)

Governorate	N	Respondent	Partner	Children	Other family member	Hired labour
Gharbia	280	6.4	75.1	18.96	0.0	0.0
Fayoum	253	31.6	49.4	9.5	9.5	0.0
Sohag	211	0.0	100	0.0	0.0	0.0
Total	744	13.2	73.4	10.3	3.2	0.0

Table 39 Who is responsible for housing the birds? (percentages)

Governorate	N	Respondent	Partner	Children	Other family member	Hired labour
Gharbia	280	6.4	75.0	18.6	0.0	0.0
Fayoum	260	26.9	48.5	13.1	11.5	0.0
Sohag	211	0.0	100	0.0	0.0	0.0
Total	751	11.7	72.8	11.5	4.0	0.0

Table 40 Who sells eggs? (percentages)

Governorate	N	Respondent	Partner	Children	Other family member	Hired labour
Gharbia	102	0.0	76.5	23.5	0.0	0.0
Fayoum	149	34.2	34.3	12.7	18.1	0.0
Sohag	22	0.0	100	0.0	0.0	0.0
Total	273	13.8	68.7	9.8	7.4	0.0

Table 41 Who sells birds? (percentages)

Governorate	N	Respondent	Partner	Children	Other family member	Hired labour
Gharbia	105	0.0	87.8	12.2	0.0	0.0
Fayoum	141	34.4	29.2	16.6	19.8	0.0
Sohag	22	0.0	100	0.0	0.0	0.0
Total	268	11.5	72.3	9.6	6.6	0.0



Breed characterization traits

Male Baladi chickens weigh an average of 1 044.7 g, and females an average of 995.5 g. Sohag has the heaviest females, at 1 062.3 g and the heaviest males, at 1 141.9 g (Table 42). These low weights are typical of the Baladi chickens raised in village conditions, and are due to the housing, feeding and management systems used by households. Such production systems are not considered intensive, and most of the households practising them have learned from their own experience or word of mouth from neighbours or traders. The systems therefore have no solid scientific basis, which is reflected in lower live weights and productivity.

The shank lengths of households' Baladi chickens and ducks are shown in Table 43. For both chickens and ducks, males tend to have longer shanks than females. The shortest shanks are in Sohag for male chickens, and for female chickens.

Table 44 presents findings on the skin and eye colours and comb types of Baladi chickens. The most common skin colour is white, with 98 percent, and the least common is black, with 0.5 percent. Single combs are the most common comb type, with 94 percent, and rose and cushion the least common, with 0.04 and 0.2 percent, respectively. Orange is the dominant eye colour, with 77 percent, and green the rarest, with 0.13 percent.

Other phenotypic characteristics of Baladi chickens are presented in Table 45. Overall, all the characteristics listed are almost entirely absent from the flocks surveyed in the three study governorates. Red is the most common earlobe colour (Table 46), with 49 percent, especially in Gharbia with 63 percent; blue is the least common, with 0.17 percent. White is the main shank colour, with 41 percent, followed by yellow with 35 percent; green is the least common shank colour, with nearly 4 percent. Fayoum has the highest proportion of white shanks at 48 percent, and Gharbia the highest of yellow, at 43 percent.

Table 42 Body weights of households' Baladi chickens and ducks (g)

Governorate	Baladi chickens				Ducks			
	Males		Females		Males		Females	
	N	Average	N	Average	N	Average	N	Average
Gharbia	166	1 141.9	791	1 041.1	17	2 724.5	32	1 854.8
Fayoum	98	820.1	877	882.3	24	1 867.0	38	1 536.9
Sohag	70	1 128.5	946	1 062.3	11	2 547.6	38	1 657.0
Total	334	1 044.7	2614	995.5	52	2 291.3	108	1 673.3

Table 43 Shank lengths of households' Baladi chickens and ducks (cm)

Governorate	Baladi chickens				Ducks			
	Males		Females		Males		Females	
	N	Average	N	Average	N	Average	N	Average
Gharbia	165	8.4	790	7.4	17	6.5	32	6.2
Fayoum	98	8.7	871	8.4	22	7.4	36	7.3
Sohag	70	8.1	946	7.2	13	5.9	38	5.2
Total	333	8.4	2607	7.7	52	6.8	106	6.2



Table 44 Skin colours, comb types and eye colours of households' Baladi chickens (percentages)

Governorate	Baladi chickens Skin colour					
	N	White	Yellow	Black	Pink	
Gharbia	1 008	98.8	1.2	0.0	0.0	
Fayoum	971	96.1	2.3	1.7	0.0	
Sohag	1 016	99.8	0.2	0.0	0.0	
Total	2 995	98.3	1.2	0.5	0.0	
Governorate	Baladi chickens Comb type					
	N	Single	Pea	Rose	Cushion	Double
Gharbia	1 013	82.9	12.3	0.1	0.6	4.0
Fayoum	982	99.6	0.4	0.0	0.0	0.0
Sohag	1 016	98.2	0.1	0.0	0.0	1.7
Total	3 011	93.5	4.3	0.04	0.2	1.9
Governorate	Baladi chickens Eye colour					
	N	Orange	Brown	Red	Pearl	Green
Gharbia	1 008	79.9	4.5	4.9	10.7	0.0
Fayoum	969	65.9	31.8	0.4	1.9	0.0
Sohag	1 016	86.0	12.5	0.0	1.1	0.4
Total	3003	77.2	16.4	1.8	4.6	0.1

Table 45 Presence of crests, frizzled feathers, naked necks, beards and muffs and silky feathers in households' Baladi chickens (percentages)

Governorate	Baladi chickens										
	Crest		Frizzled feathers		Naked neck		Beard and muff		Silky		Polydactyl
	N	%	N	%	N	%	N	%	N	%	Yes
Gharbia	1 010	2.3	699	0.0	1 010	0.9	1 009	0.1	699	0.0	9.1
Fayoum	980	1.2	721	0.0	975	3.1	980	0.0	981	1.8	5.3
Sohag	1 016	1.8	1 016	0.2	1 016	2.1	1 016	0.0	1 016	0.0	8.7
Total	3 006	1.8	2 436	0.08	3 001	2.0	3 005	0.03	2 696	0.5	7.6

Table 46 Earlobe and shank colours of households' Baladi chickens (percentages)

Governorate	Earlobe colour					
	N	Red	White	Blue	Red-White	
Gharbia	1 009	63.2	28.8	0.0	8.0	
Fayoum	984	54.1	10.8	0.5	34.6	
Sohag	1 016	30.8	43.9	0.0	25.4	
Total	3 009	49.3	28.0	0.2	22.6	
Governorate	Shank colour					
	N	White	Green Blue	Black	Yellow	Green
Gharbia	1 005	38.7	7.5	1.2	43.3	9.3
Fayoum	974	47.6	20.7	5.6	25.8	0.3
Sohag	1 016	36.3	22.1	4.3	36.0	1.2
Total	2 995	40.8	16.8	3.7	35.1	3.6



The duck population surveyed was far smaller than that of chickens. The heaviest ducks are in Gharbia, where males weigh an average of 2 724 g and females 1 854 g (Table 42). The data presented in Table 43 show that male ducks have longer shanks than females. The ducks in Fayoum have the longest shanks for both males and females.

Table 47 presents data on the shank and bill colours and the bill shapes of ducks. Black is the most common shank colour, with 41 percent overall, and 53 percent in Sohag. Grey shanks were found in only 2 percent of the ducks in Sohag, and not at all in either of the other two governorates. Pink-white is the most common bill colour, with 39 percent, reaching 53 percent in Sohag. Slate-grey is the least common bill colour, with only 0.6 percent overall. About 97 percent of the duck population has uniform bill shape, rising to 100 percent in Gharbia and Sohag governorates. Table 48 shows that white is the most common skin colour, with nearly 99 percent, and 95 percent of the surveyed ducks do not have crests. Black is the most common bean colour, with 66 percent overall and even higher proportions in Gharbia and Sohag; dark bean colour is the rarest, with just over 1 percent.

Table 49 shows that brown-red is the most common eye colour, with 59 percent, especially in Gharbia with 76 percent. Red caruncles dominate, with 94 percent, especially in Sohag with 100 percent. The ducks surveyed are predominantly of slightly upright carriage, with 77 percent, although 100 percent of the ducks in Fayoum have horizontal carriage.

Table 47 Shank and bill colours and bill shapes of households' ducks (percentages)

Governorate	Shank colour						
	N	Yellow	Grey	Grey-Black	Black	White	Slate Grey
Gharbia	51	25.5	0	5.9	39.2	29.4	0
Fayoum	58	46.6	0	0	32.8	20.7	0
Sohag	51	39.3	2.0	0	52.9	2.0	3.9
Total	160	37.5	0.6	1.9	41.3	17.5	1.3
Governorate	Bill colour						
	N	Pink- White	Yellow	Orange	Slate-Grey	Grey	Black
Gharbia	51	45.1	11.8	3.9	0	0	39.2
Fayoum	56	19.6	42.9	0	1.8	5.3	30.3
Sohag	51	52.9	13.7	0	0	0	33.3
Total	158	38.6	23.4	1.3	0.6	1.9	34.2
Governorate	Bill shape						
	N	Uniform	Saddle				
Gharbia	51	100	0				
Fayoum	58	91.0	9.0				
Sohag	51	100	0				
Total	160	96.7	3.3				

Table 48 Skin colours, presence of crests and bean colours of households' ducks (percentages)

Governorate	Skin colour			Crest		Bean colour			
	N	White	Yellow	N	Yes	N	Black	White	Dark
Gharbia	51	96.1	3.9	51	3.90	51	82.3	13.7	3.9
Fayoum	58	100	0	60	11.29	60	43.7	56.3	0.0
Sohag	51	100	0	51	0.00	51	76.1	23.9	0.0
Total	160	98.8	1.3	162	5.41	162	66.1	32.7	1.2



Table 49 Eye and caruncle colours and carriage of households' ducks (percentages)

Governorate	Eye colour					
	N	Yellow	Brown	Grey-Brown	Blue	Black
Gharbia	51	5.9	76.4	7.9	3.9	5.9
Fayoum	49	36.7	32.7	0	0	30.6
Sohag	51	5.9	66.7	5.9	17.6	3.9
Total	151	15.9	58.9	4.6	7.3	13.3
	Caruncle colour					
	N	Red	Blue	Red-Black		
Gharbia	44	95.4	4.6	0		
Fayoum	21	80.9	19.1	0		
Sohag	34	100	0	0		
Total	99	93.9	6.1	0		
	Carriage					
	N	Horizontal	Slightly Upright	Upright (50-80%)		
Gharbia	15	0	100	0		
Fayoum	9	100	0	0		
Sohag	15	0	100	0		
Total	39	23.1	76.9	0		

EPSA's contribution to the survey

EPSA's participation in this project included the following activities:

- Providing each of the households interviewed with 5 kg of poultry feed, to ease interactions with survey respondents, who have become even more reluctant to speak to strangers since the AI outbreak.
- Collecting as many photos as possible of Egyptian standard breeds from government research farms. This activity was not part of the original project proposal. This took about eight weeks to complete and involved collecting photos from farms all over Egypt. Work started in March 2009 and ended at the end of April 2009.
- Collecting blood samples from Egyptian standard breeds, to be coded and sent to ILRI for DNA analysis. This activity was also not included in the original project proposal. It too took about eight weeks to complete, and was carried out concurrently with the collection of photos.
- Adapting the original questionnaires sent by FAO at the beginning of the project to ensure that all parameters were appropriate to conditions in Egypt. The parameters adapted included:
 - education level of household head;
 - landownership and rental;
 - area of landholdings.
- Training of veterinary students majoring in poultry to work as part of the survey team in Fayoum. This gave them excellent hands-on experience.

The adapted parameters were used during the second phase of the fieldwork.



Challenges and obstacles encountered

The presence of a female member on each survey team would have helped ease communications with households, and gained their confidence. However, this was not possible, as the culture in Sohag, for example, prevents women from working or travelling for almost a day to carry out fieldwork with strangers.

The original proposal was to survey three governorates only, and this had been decided before EPSA was contacted to conduct the fieldwork. The staffs of EPSA feel that more governorates and villages should have been covered, such as Siwa oasis in Wahat, eastern Egypt. Covering these districts would have generated results that were more representative of the overall situation for small-scale village poultry producers and household poultry production in Egypt.

Conclusion

The implementation of effective poultry production programmes in many developing countries in Asia, Africa and Latin America has increased poultry numbers, household purchasing power, the consumption of poultry products and – most important – the decision-making power of women (Dolberg, 2003; Alders and Harun, 2004; Alders *et al.*, 2007).

One of the Millennium Development Goals (MDGs) is to eradicate extreme poverty and hunger. Village poultry contributes to this by increasing the income and improving the food security of households (Alders and Harun, 2004), as poultry is often the only livestock owned by the poorest people in many parts of the world (Dolberg, 2003). Another MDG is to achieve universal primary education, and village poultry is often sold to generate cash to pay for children's education in poor families (Alders and Spradbrow, 2001). Family poultry's contribution to many very poor communities has helped keep these communities above the poverty line (Bell, 2009).

It is noticeable that many of the countries that now have outbreaks of HPAI and H5N1 have commercial poultry production alongside significant numbers of small-scale poultry producers with poor biosecurity practices (Sims, 2007). Poultry has contributed to human health and well-being for many centuries, and village poultry production is now an important improved livelihood strategy for millions of rural people who live near urban communities. Collaboration between village poultry producers and producers in the commercial sector will make it possible not only to improve the well-being of rural communities, but also to produce good-quality poultry and poultry products for urban consumers who can pay premium prices for such products.

Does smallholder poultry have a future? The question arises from the current health concerns regarding birds in developed and developing countries all over the world. Poultry flocks can be classified in many ways, including as to whether they are industrialized, safety net or asset builder flocks. This report has been concerned with the third type, the asset builder flocks, which are the small to medium-sized flocks that help many families to acquire assets as a way out of poverty. Many of these flocks are of hybrid chickens, which represent a large proportion of their owners' income and are often financed through loans. Owing to their fast turnover, asset builder flocks are considered an effective way of making money, but they are highly risky and depend on good marketing communications and connections. It should be made clear that the genetic make-up of village poultry is not considered a limiting factor to the production efficiency or profitability of smallholder poultry production (Bell, 2009).

The answer then is "Yes", there is definitely a future for smallholder poultry production, especially in many African and Asian countries, and wherever there are poor rural families and communities.



Policy-makers, governments and NGOs should therefore aim to secure an environment for economic growth, while at the same time protecting the most vulnerable producers (McLeod *et al.*, 2009).

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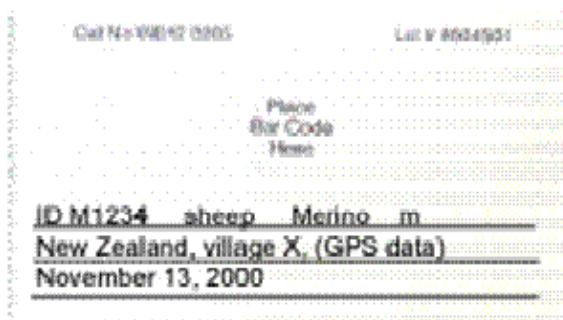


Annexes

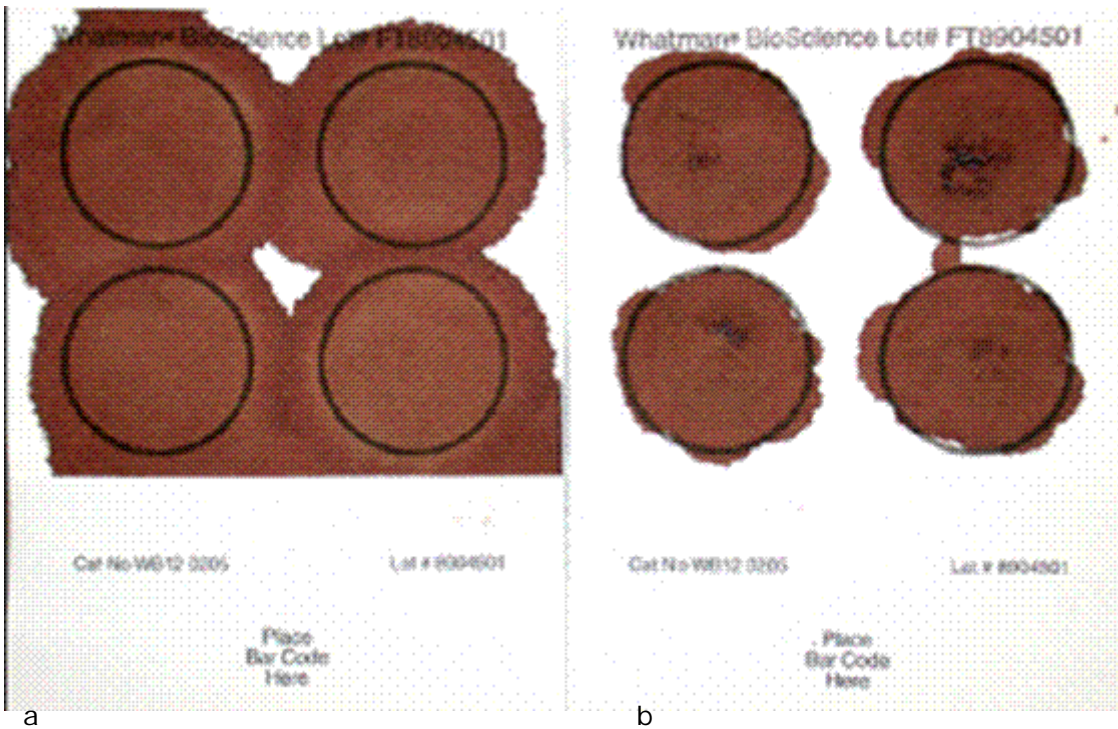
Annex 1 Instructions for collection of blood on filter papers (FTA-filter papers Whatman) for DNA extraction

- 1) Make sure hands are clean and dry. If hands are wet or dirty, put on a new pair of disposable gloves just before collecting the blood.
- 2) Use a new, sterile blood lancet or needle for each individual, and one filter paper (four spots) per individual. For birds (e.g., chickens), blood is collected from the brachial vein in the wing; for mammals from the jugular vein. Collect blood in four micro-haematokrit capillary tubes (birds) or in heparinized/EDTA tubes (mammals) and transfer it to the filter paper.
- 3) On the filter paper, write clearly in permanent ink:
the individual identification, species, population or breed name, sex;
the location (village name and the GPS location when possible), date (Figure A1).

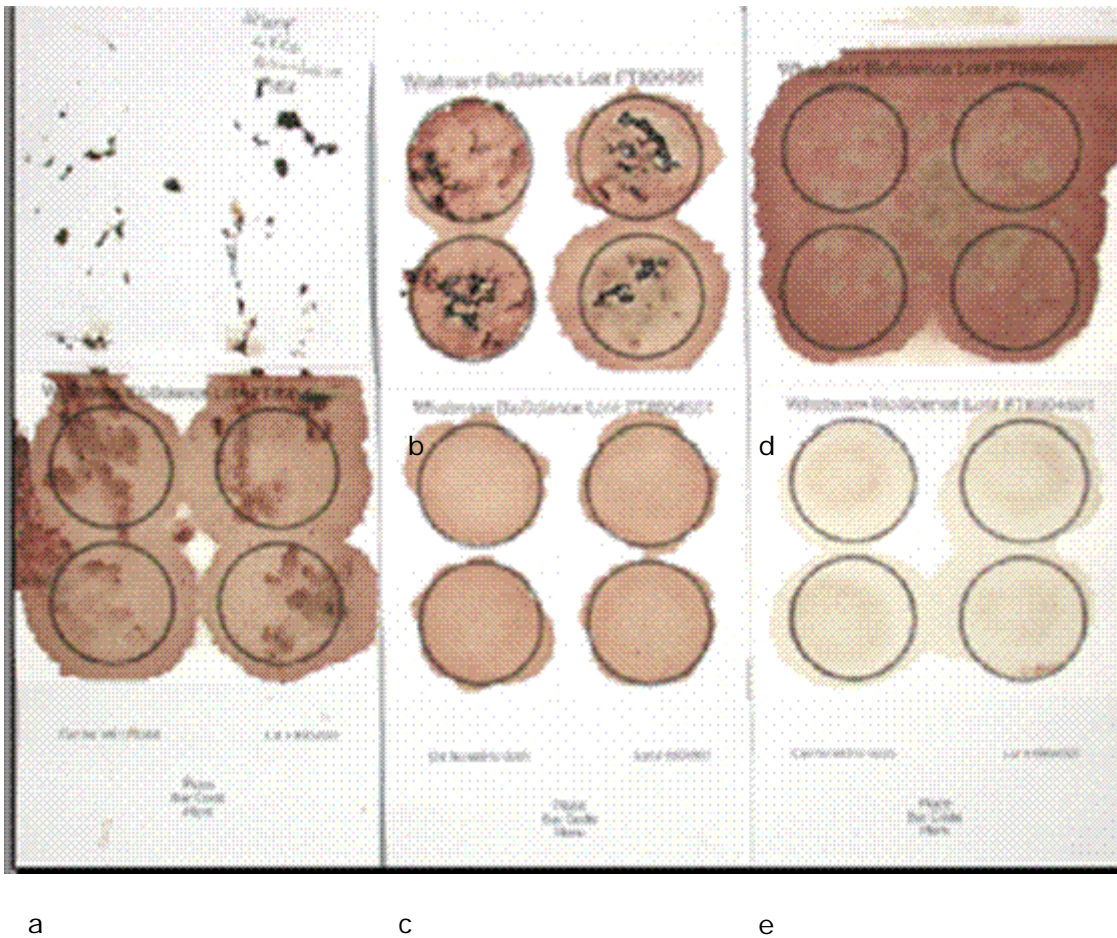
Figure A1 Labelling of filter paper with all necessary information.



- 4) After blood spotting, allow the filters and blood to dry fully (see good and bad examples in Figures A2 and A3). Put the filter papers in a sealed plastic bag containing silica gel beads to absorb humidity.
- 5) Store the bags at room temperature, protected from direct sunlight, and avoiding high temperatures and temperature changes.

Figure A2 Good blood collection on filters papers, suitable for genetic analysis

In Figure A2, full blood has been spotted on the filter paper. Blood from only one individual should be spotted on each filter paper (four spots). The overlapping of blood spots as on filter a is not a problem, but ideally blood should fill only the circles. There are some clotted blood spots on filter b, but the other areas are fine. Both filters were dried properly before storage with silica beads.

Figure A3 Bad blood collection on filter papers, not suitable for genetic analysis

In Figure A3, diluted blood cells (filters a, b, c) or even pure serum (filter e) have been spotted rather than full blood. Very little if any DNA can be extracted from this kind of sample. The blood samples on filters a and b are clotted. Full blood has been spotted on filter d, but the paper was folded and stored before the samples were fully dry. The greenish spots indicate bacterial/fungal growth. DNA extracted from such a filter paper will likely be degraded.

Annex 2 Poultry production system evaluation

Enumerator:	Farm code:
-------------	------------

Identification and characteristics of sample household

1. Characteristics of household		
Date:	Regular radio listener: 1 = yes 2 = no	
District:	Regular TV viewer ^{1*} 1 = yes 2 = no	
Village:	Mobile or other phone access: 1 = yes 2 = no	
GPS coordinates:		
Name of respondent:	Land owned: 1 = Nil 2 = Marginal: ≤ 0.3 ha 3 = Marginal/small: ≤ 1 ha 4 = Semi-medium: ≤ 5 ha 5 = Medium: ≤ 10 ha 6 = Large: > 10 ha	
Male: <input type="checkbox"/> Female: <input type="checkbox"/>		
Age:		
Name of household head:		
Education of household head: Education of respondent: 0 = No school 1 = Grade school 2 = High school	HH: RES:	Household size (sharing common kitchen): 1 = 1–5 members 2 = 6 or 7 members, 3 = 8 or 9 members, 4 = > 9 members

2. Farm characteristics		
Main crops summer*	Proportion of land	Main use (1 = Market, 2 = HH consumption)
Main crops winter*	Proportion of land	Main use (1 = Market, 2 = HH consumption)

	Main use (1 = Market, 2 = HH consumption)	Priority for the family (1-5) 1 = Lowest, 5 = Highest
Large ruminants		
Small ruminants		
Pigs		
Poultry		
Chickens		

¹ Included for the second phase



Ducks		
Other		

Animal numbers and flock management

Category	Calves/ lambs/ kids	Female		Male		Total
		< 2 years	≥ 2 years	< 2 years	≥ 2 years	
Cows/bulls						
Buffaloes						
Sheep						
Goats						
Pigs						

Local chickens owned						Total
	Female			Male		
	Chicks	< 6 months	> 6 months	< 6 months	> 6 months	
	< 1 month	< 6 months	> 6 months	< 6 months	> 6 months	
Chickens						
Ducks						
Other (name)						

Improved (crossbreed) chickens owned						Total
	Female			Male		
	Chicks	< 6 months	> 6 months	< 6 months	> 6 months	
	< 1 month	< 6 months	> 6 months	< 6 months	> 6 months	
Chickens						
Ducks						
Other (name)						

	Chickens	Ducks
2.21 Did the number of birds in your poultry flock change during the last 5 years? 1 = no, remained same 2 = yes, increased 3 = yes, decreased		
2.21 Does the number of birds in your chicken flock change with the season? 1 = yes 2 = no		
2.22 Which months are chicken numbers highest?		
2.23 Which months are chicken numbers lowest?		

Separate form for chickens and ducks from here

2.3.a. Do you buy birds for your flock? <input type="checkbox"/> Yes <input type="checkbox"/> No (go to Q 2.4.a)
2.3.b. If YES, where do you buy birds? <input type="checkbox"/> Market <input type="checkbox"/> Commercial chicken farm <input type="checkbox"/> Neighbour <input type="checkbox"/> Other:
2.3.c. If YES, what kind of birds do you buy? <input type="checkbox"/> Local breed <input type="checkbox"/> Young birds <input type="checkbox"/> Improved breed <input type="checkbox"/> Adult birds
2.3.d. Check all the criteria you use for the selection of birds you buy:



No special criteria:	<input type="checkbox"/> Yes	Remarks _____
Size/weight:	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Longevity:		
Ability to live on its own (needs no housing, good scavenger):	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Number of eggs laid:	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Colour of eggs laid:	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Flavour of meat:	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Disease resistance:	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Good mothering qualities	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Colour or pattern of plumage		
Other reasons (describe)		

2.4.a.	<input type="checkbox"/> Yes	
Do you hatch your own eggs?	<input type="checkbox"/> No	
2.4.b.	<input type="checkbox"/> Yes	
Do you try to get better birds for your flock?	<input type="checkbox"/> No (go to Q 3.1 a)	
2.4.c.	<input type="checkbox"/> From my own flock	Why? _____
If YES, where do you get better birds?	<input type="checkbox"/> From a neighbour	
	<input type="checkbox"/> From the market	
	<input type="checkbox"/> From a commercial chicken farm	
	<input type="checkbox"/> Other:	

2.4.d. Check all the criteria you use for selection of the birds you use to improve your flock:

Size/weight:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Remarks _____
Longevity:	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Ability to live on its own (needs no housing, good scavenger):	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Number of eggs laid:	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Colour of eggs laid:	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Taste of meat:	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Disease resistance:	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Good mothering qualities		
Colour or pattern of plumage		
Other reasons (describe)		



Production technology

3.1.a. Are your birds housed all day and night?	<input type="checkbox"/> Yes <input type="checkbox"/> No
3.1.b. If NO, are your birds housed at night?	<input type="checkbox"/> Yes <input type="checkbox"/> No (go to Q 3.1.e)
3.1.c. If your birds are housed (either only at night, or all day/night long), please describe the housing type:	<input type="checkbox"/> Simple construction with on-farm materials <input type="checkbox"/> Simple construction with purchased materials <input type="checkbox"/> Improved construction (e.g., disease vector control, climate control)
3.1.d. If your birds are housed, how do you dispose of manure?	<input type="checkbox"/> No special disposal or storage <input type="checkbox"/> Feed to other animals <input type="checkbox"/> Use as fertilizer <input type="checkbox"/> Sell Other:
3.1.e. If your birds are NOT housed, give a reason	<input type="checkbox"/> Not enough money to build <input type="checkbox"/> Not necessary, birds do well without Other:
3.2.a. Do you provide feed to your birds?	<input type="checkbox"/> Yes <input type="checkbox"/> No (go to Q 3.3.a)
3.2.b. If YES, do you purchase feed for your birds?	<input type="checkbox"/> Yes <input type="checkbox"/> No
3.2.c. If YES, approximately how much of the feed that you provide to your birds is purchased?	<input type="checkbox"/> 100 percent <input type="checkbox"/> 50 percent <input type="checkbox"/> 75 percent <input type="checkbox"/> 25 percent <input type="checkbox"/> 0 percent
3.2.d. If YES, describe the type of feed for your birds:	<input type="checkbox"/> Purchased concentrate feeds <input type="checkbox"/> Concentrate feeds (grains) produced on own farm <input type="checkbox"/> Other (please name):
3.2.e. If YES, describe the source of purchased feed for your birds	<input type="checkbox"/> Market <input type="checkbox"/> Neighbour Other:



We define three periods for estimating mortality.	Age period 1: Up to 1 month of age Age period 2: From 1 to 6 months of age Age period 3: From laying age onwards
3.3.a. Do you take note of the mortality of your birds?	<input type="checkbox"/> Yes <input type="checkbox"/> No
3.3.b. If you incubate eggs by broody hens try to give the following numbers:	Number of chicks hatched per mother: Number of chicks surviving period 1 per mother: Number of chicks surviving period 2 per mother:
3.3.c. If you purchase day-old chicks try to give the following numbers:	Proportion of chicks surviving period 1: Proportion of chicks surviving period 2:
3.3.d. Name the most important reason for losses in period 1:	<input type="checkbox"/> Disease <input type="checkbox"/> Accident <input type="checkbox"/> Predator (incl. theft) <input type="checkbox"/> Unknown reason
3.3.e. Name the most important reason for losses in period 2:	<input type="checkbox"/> Disease <input type="checkbox"/> Accident <input type="checkbox"/> Predator (incl. theft) <input type="checkbox"/> Unknown reason
3.3.f. Name the most important reason for losses in period 3:	<input type="checkbox"/> Disease <input type="checkbox"/> Accident <input type="checkbox"/> Predator (incl. theft) <input type="checkbox"/> Unknown reason
3.3.g. What is the season of the year with the highest losses?	
3.3.h. Do you use veterinary services for your birds?	<input type="checkbox"/> Yes <input type="checkbox"/> No
3.3.i. Do you vaccinate your birds?	<input type="checkbox"/> Yes <input type="checkbox"/> No
3.3.j. If YES, for which diseases do you vaccinate your birds?	

Market and labour

4.1.a. Do you sell birds?	<input type="checkbox"/> Yes <input type="checkbox"/> No
4.1.b. If yes, where?	<input type="checkbox"/> To neighbours <input type="checkbox"/> Local market (< 10 km distance) <input type="checkbox"/> Regional market (> 10 km distance) <input type="checkbox"/> To traders who come to the village Other:
4.1.c. Do you sell eggs?	<input type="checkbox"/> Yes <input type="checkbox"/> No
4.1.d. If yes, where?	<input type="checkbox"/> To neighbours <input type="checkbox"/> Local market (< 10 km distance) <input type="checkbox"/> Regional market (> 10 km distance) <input type="checkbox"/> To traders who come to the village Other:
4.2.a. Who in your family is responsible for the birds?	<input type="checkbox"/> Yourself <input type="checkbox"/> Your partner <input type="checkbox"/> Your children <input type="checkbox"/> Other family members <input type="checkbox"/> Hired labour
4.2.b. Who in your family is responsible for	<input type="checkbox"/> Yourself



feeding the birds?	<input type="checkbox"/> Your partner <input type="checkbox"/> Your children <input type="checkbox"/> Other family members <input type="checkbox"/> Hired labour
4.2.c. Who in your family is responsible for housing the birds (cleaning, maintenance)?	<input type="checkbox"/> Yourself <input type="checkbox"/> Your partner <input type="checkbox"/> Your children <input type="checkbox"/> Other family members <input type="checkbox"/> Hired labour
4.3.d. Who in your family sells eggs?	<input type="checkbox"/> Yourself <input type="checkbox"/> Your partner <input type="checkbox"/> Your children <input type="checkbox"/> Other family members <input type="checkbox"/> Hired labour

4.3.e. Who in your family sells birds?	<input type="checkbox"/> Yourself <input type="checkbox"/> Your partner <input type="checkbox"/> Your children <input type="checkbox"/> Other family members <input type="checkbox"/> Hired labour
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Annex 3 Individual observations of the chickens

Farm code:					
Animal/no.	1	2	3	4	5
Photo number in camera					
Sex: Female = 1, Male = 2					
Body weight (g)					
Shank characteristics					
Colour: White (W) Grey-blue (GB) Black (B) Yellow (Y) Green (G) Blue (BL)					
Shank length (cm)					
Skin colour					
White (W) Yellow (Y) Black (B) Pink (P)					
Comb type					
Single (S) Pea (P) Rose (R) Cushion (C) Double (D)					
Earlobe colour					
Red (R) White (W) Blue (B) Red-white (RW)					
Eye colour					
Orange (O) Brown (B) Red (R) Pearl (P) Green (G)					
Crest: Yes = (Y), No = (N)					
Other characteristics					
Naked neck: Yes = (Y), No = (N)					
Beard and muffs: Yes = (Y), No = (N)					
Polydactyl: Yes = (Y), No = (N)					
Frizzled: Yes = (Y), No = (N)					
Silky: Yes = (Y), No = (N)					
Other observations					



Annex 4 Individual observations of the ducks

Farm code:					
Animal/No.	1	2	3	4	5
Number of photo from camera					
Sex: Female = 1, Male = 2					
Body weight (g)					
Carriage: Horizontal (H), Slightly upright (SU), Upright (50–80°) (U)					
Shank characteristics					
Colours: Yellow (Y), Green (G), Slate- grey (SG), Black (B), White (W)					
Shank length (cm)					
Bill characteristics					
Colour: Pink-white (PW), Yellow (Y), Orange (O), Slate-grey (SG), Green (G), Black (B)					
Uniform (U), Saddle (S)					
Bean: White (W), Dark (D), Black (B)					
Skin colour					
White (W), Yellow (Y), Black (B)					
Eyes colour					
Yellow/Orange (Y), Brown (BR), Grey- brown (GB), Blue (Bl), Black/Pearl (B)					
Crest: Yes = (Y), No = (N)					
Other characteristics in Muscovies					
Caruncle colour: Red (R), Black (B) Red-black (RB)					
Other observations					

