**Emergency assistance for the control of avian influenza**

**TCP/PAK/ 3002(E)**

**Final Technical Report**

**by**

**Dr. J.H. Lambers**

**Food and Agriculture Organization of the United Nations**

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 **TECHNICAL REPORT SAMPLE**

**OBJECTIVES OF THE MISSION**

The FAO TCP/PAK/3002(E) project has the primary objective of supporting efforts aimed at the immediate control of avian influenza (AI) outbreaks in all poultry species, so as to stop the transmission of the disease from poultry to humans. The terms of reference of the mission are attached as Annex 6 in this report. The perspective of the inception mission was fact-finding and to assist in developing a detailed work plan for he project; to initiate appropriate activities and to begin procuring inputs for avian influenza control. As chickens are by far the predominant species, other species were left out of consideration during this mission.

**POULTRY FARMING IN PAKISTAN:**

Pakistan is a federal state with autonomous provinces. The total human population is about 150 million people, mainly living in highly concentrated areas. Total chicken population is about 280 million. There are few turkeys, few ducks, and some quails. Doves are kept in backyards. The poultry industry has developed freely under minimal regulatory controls. There are some professionally integrated poultry production systems, but most of the farms are small.

There are some 21,000 established farms and 38 million chickens are kept in backyard operations. Poultry and poultry products are directly related to the local markets and not meant for export. Apart from the professional integrators, there is generally poor, basic infrastructure for poultry production. Chickens are kept close to areas with large human population. Live broilers are sold to consumers directly. Poultry breeders are mainly concentrated in the area of Abottabad, in the north of the country. There are no major long- distance transport lines for consumer eggs or for broilers, except for some movements towards the Karachi region in the South.

**Number of birds and farmers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Pakistan** |  | **Punjab** | **NWFP** | **Sindh** |
|  | **Commercial** | **Rural** |  | **Commercial** |  | **Commercial** |
| **No. of birds** |  |  |  |  |  |  |
| Breeders |  7 M |  |  | 2,5 M | 3,5 M |  |
| Layers |  18 M |  |  |  |  |  9 M |
| Broilers | 255 M |  |  | 142 M |  | 92 M |
| **Total** | 280 M | 38 M |  |  |  |  |
|  |  |  |  |  |  |  |
| **No. of farms** |  |  |  |  |  |  |
| Breeders  |  575  |  |  |  |  |  |
| Layers |  4.650 |  |  |  |  | 1595 |
| Broilers | 15.775 |  |  |  |  | 2275 |
| **Total** | 21.000 |  |  |  |  |  |

|  |
| --- |
| Vaccine producers : 8 (governmental: 3, private: 5) |
| Processing plants: 2 |
| Hatcheries: 150 |

**HISTORY OF AVIAN INFLUENZA IN PAKISTAN**

Discussions with relevant authorities and information from reports indicated the following sequence of events relating to AI outbreaks in Pakistan:

**1995:**  First reports of highly pathogenic avian influenza (HPAI) outbreaks in Pakistan in Murree and Punjab provinces. Outbreaks occurred mainly in breeders. Serotype H7N3 was isolated and characterized. Apparently successful eradication, using inactivated virus vaccines.

**1998:** Outbreak in Sindh province, a Karachi town. Mainly broiler farms. Serotype H9N2 was isolated. High mortality particularly in young broilers. No systematic eradication plan was followed. Inactivated AI virus vaccines were used and no persisting large outbreaks were observed.

**1999:** More seropositive findings on AI appeared throughout the country. No reports of major outbreaks of HPAI. Nevertheless, heavy losses due to “respiratory distress syndrome” occurred. Inactivated AI virus vaccines were used.

**2003: March:** Massive AI outbreaks in Sindh province. Virus serotype H7 was isolated. Partial culling, use of inactivated AI virus vaccines were used to control the outbreaks with doubtful effects.

**2003: December:** New massive outbreaks in Sindh province. Mostly in layer flocks and not in broiler operations. Virus isolations were serotypes H9N2 and H7N3.

**2004: February:** Public looses confidence in poultry products.

**FACTS AND OBSERVATIONS DURING MISSION**

* Outbreaks of HPAI serotype H7N3 had occurred in layers in and around Karachi up to the end of January 2004. Recently, no outbreaks have been reported and no signals of possible AI outbreaks have been recorded.
* There are no reports of the occurrence of the disease in humans related to circulating AI viruses in poultry in Pakistan.
* Communications about the presence of AI viruses in Pakistan have led to a general loss of public confidence in food safety of poultry products. This has had dramatic economic consequences, especially on individual small-scale farmers.
* There are no recent reports of HPAI outbreaks in Pakistan, with the exception of the Karachi region.
* There is no evidence of low pathogenic avian influenza (LPAI) virus serotype H7 being present in some regions in Pakistan.

AI virus serotype H9N2 appears to be present in Pakistan, in Karachi, and elsewhere. Though not proven to be HP, these viruses might cause considerable economic losses.

* No recent survey has been done about possible presence of AI serotypes, H7 / H9, in Pakistan.
* Culling has not been done to any substantial extent, neither on a systematic basis nor under supervision by the government. There are no funds to compensate farmers for culling, and the absence of financial compensation has served as a disincentive for reporting outbreaks.
* Rendering and transport of poultry meat, waste materials and carcasses are poorly controlled by the authorities.
* There is no structural national surveillance system in place on AI in poultry.
* No active surveillance has been done in humans on potential AI infections.
* There is no effective early warning system, reporting outbreaks of diseases in poultry.
* Reporting of suspected clinical findings is not compulsory.
* There are very few regulations on hygiene and bio-security in poultry production, and processing and public understanding of hygiene and bio-security is generally very poor.
* Diagnosis of AI is complicated by many other respiratory infections occurring in the country.
* Poultry breeding is concentrated in the North and transport of poultry or poultry products is generally southbound.
* A ban has been put on transports between the provinces. However, it is unclear how effective this is. Breeder eggs were not included in the ban.
* The ban has not led to any governmental action, except for a quick field survey
(questionnaire, serological monitoring) in the province of Punjab.
* No information is available on AI viruses in migratory birds in Pakistan.
* There are numerous ways for AI viruses to survive within infected areas. This is due to a low level of hygiene and bio-security, poor housing and unsystematic approach of procuring inputs.
* The presence of so-called poultry estates, close to densely populated areas is a point of concern, especially where many small farms have conglomerated. The Karachi province especially, is a place of great concern, where many risk factors for continuous virus circulation and major outbreaks are present.
* A well-equipped national reference lab is in place, yet it is not ready to perform key quality controls on poultry vaccines. There is a central poultry veterinary research lab, which is poorly equipped.
* A high level of knowledge is present about AI viruses. There is experience in both vaccine production and in the use of these vaccines.
* Throughout the country government laboratories and staff are generally available but the laboratories are poorly equipped.
* There is an extensive structure of government field workers throughout the country. The organization so far is not effective in controlling the AI situation in the field.
* Vaccinations with homologous killed virus vaccines of both AI serotype H7 and H9 are common practice in Pakistan. Except for large integrated producers, there is no systematic approach (Non-integrated producers might have no long-term strategy about vaccination).
* Live virus vaccines, such as against ND, are produced in several laboratories. There is the risk of contamination with other viruses such as AI.
* There is an operational informal network of poultry producers, veterinarians and private laboratories. They have relevant information and they are likely to share this information under certain conditions.
* Transparent communication between Pakistan Poultry Organization and government is frustrated by conflicts of interest. There is no clearness about the consequences in case of outbreaks of LPAI, HPAI suspect clinical signs, seroconversion or virus isolation. Both the Pakistani authorities and poultry producer organizations are aware of this situation and are ready to face the problems and to find solutions.

**DISCUSSION**

Avian influenza viruses are present in Pakistan, especially in the South. In and around Karachi, major outbreaks of HPAI serotype H7 have been observed in 2003, until January 2004. Elsewhere in the country the situation remains unclear, as long as there is no systematic surveillance program in place. Since HPAI serotype H5 was found in East Asia, publicity about HPAI could easily lead to a collapse of public confidence in the safety of poultry meat and eggs among the poorly informed Pakistani people. Government and poultry organizations have not been able to produce proper relevant information in time, partly due to a lack of transparency.

Up until now, no information on possible AI H5 strains in Pakistan has been available, since H5 antigen has not been included in serotyping. It is surprising that no active monitoring has been done on AI related disease in humans, nor on prevalence of serological titers, not even in those people who were at risk during the previous outbreaks. On the H7 and H9 strains, further typing has been done and an international reference institute has confirmed the presence of serotypes H7N3 and H9N2. As long as there are no reports of diseased persons and no massive spread of viruses, concern about the acute threat to human health certainly seems somewhat overplayed. In this context, the loss of confidence in food safety is rather disturbing in a country where poultry products are the best available source of high quality animal protein to the poor. The economic damage to poultry producers as a result of falling prices is obviously a bigger loss than the disease outbreaks themselves.

In case of major outbreaks, culling has only been done on the initiative and at the cost of the owner. It is likely to have been performed under unacceptable conditions, as far as minimizing human health risks, for animal welfare and particularly for the prevention of virus spread. Carcasses of dead chickens might have been transported in vehicles, and used afterwards for feed transport. No obvious proof has been found that there is any control on the rendering process and on the risk of cross contamination, particularly with feed ingredients. The same is true for the management of contaminated manure. Local government does not seem to be prepared nor equipped to perform proper culling. It is unclear if there is a notifiable disease combating scenario in place. In fact, it was even unclear if notification of AI by farmers and veterinarians was compulsory.

As long as no financial compensation is available, it was doubtful if individual farmers, veterinarians or large scale producers would report an outbreak of AI in an early stage to the authorities, even though an initiative has been taken to make veterinarians aware of the importance of this. It is obviously one of the key elements in the inability to combat the disease.

 Moreover, it is a handicap in creating a transparent, reliable monitoring system for disease control throughout the country. Discussions have been started in order to raise funds to solve this problem. Avian influenza, be it the LPAI or HPAI form, is likely to be confused in the field with other respiratory diseases, such as ND, infectious bronchitis (IB), *Mycoplasma gallisepticum* (MG). Other respiratory distress syndromes might be triggered by immunosuppressive agents, poor housing, and inappropriate feed composition as well as the climate.

There is very poor understanding of hygienic principles in general. This is not only specific to the smallholder and the backyard farmer, but at every production level this is present, except for some large scale producers. When visiting an obviously infected location, no precautions for virus spread were taken. The open type of housing makes it easy for birds, rodents and insects to enter the premises. No transport cleaning facility was seen. The structure of transports, marketing and slaughtering of poultry where many private transporters, contractors, salesmen and butchers were active, will make it hard to ever achieve a transparent tracking and tracing system, or at least a proper understanding of the pathways of infection.

There appears to be insufficient regulations at various levels, in order to protect poultry production and processing from relevant risks.

This is with respect to basic guidelines on bio-security such as minimal distance between farms, basic equipment used to clean and disinfect vehicles that carry poultry products, rendering, manure disposal, compulsory reporting of suspected disease outbreaks, and safety of vaccine production. Besides all this, there is backyard poultry farming almost everywhere. It seems that the poultry industry has developed rather freely. Nevertheless, the present situation requires the need for more stringent structures to be put in place. In several discussions, it appeared that the poultry industry was well aware of this.

A ban has been put on transport between the provinces. However, it is unclear how effective this ban is, because breeder eggs are not included. In case of an infected breeder farm, virus could easily spread over a wide area. Once a better overview is acquired of the situation in the field it seems reasonable to lift the ban, except for the infected area around Karachi. The ban so far, has only motivated one province (Punjab) to monitor the field situation, by a quick field survey. The given results are reassuring, though the result of serotyping has not yet shown.

AI viruses could eventually enter the country or spread through it in several ways. Little is known about AI viruses in migratory birds. The risk of importing infected live virus vaccines or infected breeders is hard to quantify, as no risk assessment has been done in this direction, nor checks have been made. Apart from this, a virus might easily establish or persist in any area with intensive poultry farming, especially where many small farms have concentrated into a so called poultry estate. Such an area has to be considered as a single epidemiological unit, because wild birds are numerous everywhere when there are poultry, poultry litter and humans.

As there is no proper and sustainable monitoring system on virus circulation and on clinical outbreaks, this has to be installed. Government structures can be used for this. Also, the private laboratories are likely to share the information they have acquired. Therefore, a guarantee has to be agreed on privacy, and conflicts of interest have to be avoided.
It is one of the main perspectives of the current TCP to help and realize such a monitoring scheme. In each province there is a regional structure, due to give technical support to local poultry farming. These structures can then be used to collect samples, to administer questionnaires, to advise on hygiene and bio-security, after proper training. The regional labs, though sometimes very poorly equipped, can have a function in basic processing of information and in laboratory testing, after they have been equipped additionally and have been provided with materials. Under these conditions the local authorities are likely to cooperate, though some problems remain, where materials are asked for that cannot be provided within the outlines of this TCP project. Local private laboratories could be encouraged to share information, relevant to the monitoring scheme, if they are provided with relevant material. Two central laboratories are in place.

For the final processing of samples in a monitoring system such as virus isolation and typing, the National Agricultural Research Centre is suitable. Though this is basically a research laboratory, it is the only place where this can be done and which also has knowledgeable and experienced staff. The laboratory is rather poorly equipped. For reference tests and for vaccine testing, the National Veterinary Laboratory is designated. This laboratory is well equipped; it will not be able to do the job until at least the middle of this summer because of insufficient knowledgeable and experienced staff.

In many places, AI virus vaccines were used. This is done on an individual basis. Though producers may use vaccination as part of their control strategy, there is no overall systematic approach. In case of outbreaks, there were no organized ring vaccinations, no solid blanket vaccinations. As a result, the situation seems rather chaotic. Only homologous inactivated AI virus vaccines were used, as was observed. They were produced in at least three local laboratories by government and private entrepreneurs. Virus multiplication is done on locally produced non-SPF eggs and under insufficient bio-containment facilities.

 This is dangerous, especially where HPAI virus is used. Moreover, in various laboratories, live ND vaccines were produced, under the same conditions. The possibility of spreading AI virus in this way is an unacceptable risk. In a mission, related to this TCP project, Dr I Claasen reported about this separately.

The Karachi region brings special concern. It is most unlikely that the HPAI virus has disappeared from the scene, though no recent outbreaks have been reported. Obviously, various risk factors for virus circulation are present in and between the poultry estates. Only a very thorough survey into the situation will lead to solid advice about the way to eradicate the virus from this region.

At all places visited during the mission, the feeling was that both veterinary authorities and poultry organizations were very much aware of the situation of AI in Pakistan and seemed ready to take the relevant steps in order to achieve a better situation of disease management.

**CONCLUSIONS**

1. HPAI virus, serotype H7N3 is still likely to be present in Pakistan - in and around Karachi province. In the rest of the country the situation is not clear, though no outbreaks have been reported recently. AI virus, serotype H9N2 is likely to be present in and around Karachi and presumably in other parts of the country. No information is available on other AI serotypes such as H5.
2. There is no reason to be concerned about any acute imminent or major public health threat posed by AI, as long as no new outbreaks are seen and as there are no signs that the present strains in Pakistan are infective to humans.
3. Inadequate communication on public health risk has led to great economic damage to the poultry farmers, endangering continuity of food production.
4. Regulations seem to be insufficient and fragmented. This needs to be improved, in order to enhance bio-security, hygiene, tracking and tracing, notification and quality of vaccine production.
5. Culling has barely been performed in outbreaks. As long as there is no financial compensation facility, culling will affect transparent communication about outbreaks or virus circulation. There is no consistent surveillance of the field situation. Minor outbreaks might not be noticed. Achievement of a sustainable monitoring system throughout the country seems feasible.
6. In many ways, AI viruses could spread throughout provinces and keep circulating within the local poultry population. This is due to the structure of poultry farming, presence of wild birds, poor bio-security and to poor understanding of hygiene principles.
7. Vaccination has to be used as part of the combat plan, both in ring vaccinations around an outbreak, as strategically used in integrated structures. Vaccine production within the country is valuable, as it helps the country to be self-sufficient in the control of AI; nevertheless, it should be brought to a higher quality and technical level. Live virus vaccine production brings unacceptable risk to the spread of AI virus, under the present conditions.
8. The Karachi region is likely to harbor circulating HPAI virus still. A thorough survey has to be done to get a better understanding of the way to achieve total eradication of AI here.
9. Karachi is an ideal place to get experience in eradication of AI in a populated area, having intensive poultry farming. This is because of the bad initial situation, the presence of field viruses, and the experience already available in using vaccines and because of the provisions of this TCP project.
10. Pakistan authorities and poultry producers organization are aware of the need to get AI viruses fully controlled.

**RECOMMENDATIONS**

1. Start up an overall monitoring system, by randomly collecting information on circulating AI viruses and outbreaks. The system could be sustainable; therefore, it must include peripheral and regional structures. Keep in close contact with poultry farmer’s organization. Questionnaires about epidemiologically relevant details serology and virus isolation. Enhance laboratories and provide materials, such as antigens. Use this TCP project to achieve this. Install a platform in order to evaluate the findings and to decide on actions to be taken. Communicate the results wherever relevant, to public health officials.
2. Do a broad survey in order to get clear recommendations for improving regulations needed to achieve an acceptable government control on basic bio-security, tracking, tracing and vaccine production with respect to AI control.
3. Make contingency plans (see Annex 3) and a central depot containing hygiene materials for first aid and people protection in case of outbreaks.Provide regulations, training and materials for proper culling in case of major outbreaks. Raise a fund in order to compensate farmers for culling. Spin-off of these funds will be a better reliability for early warning and monitoring systems.
4. Enhance quality of AI-vaccine production in laboratories, under government and private control. Do controlled case studies on vaccine performance, concerning the risk of field virus shedding in infected vaccinated birds.
5. Use vaccination as one of the tools in the control of AI, both as ring vaccinations in case of an outbreak and as a part of strategy within integrated structures.
6. For the Karachi region: perform a thorough survey in order to get a better understanding of the ways to achieve total eradication of AI here, using inactivated AI vaccines in a strategic way. Use this TCP project to start this up, seeking additional funds to fulfill this. Present the Karachi project as a pilot project for AI eradication in an overcrowded South Asian area.

**ACHIEVEMENTS UNTIL PRESENT**

Fact finding mission performed, recommendations made;

Network raised to fulfill further plans;

Monitoring system designed;

Proposals formulated for adjustment of this project;

Proposals formulated for a spin-off project around Karachi;

**PROPOSAL TO ADJUST THE ORIGINAL WORK PLAN OF THE**

**TCP/ PAK /3002 (E) PROJECT**

**I. BACKGROUND AND JUSTIFICATION**

After the initial mission and considering the report of Mr. I Claasen, the original project plan has to be further specified and adjusted. The focus is on adequate surveillance and proper reaction to outbreaks of AI. The complex situation in and around Karachi brings the need for a more intensive approach in this province. To perform a detailed epidemiological survey and analysis is partly beyond the possibilities of this TCP project. Therefore, a proposal will be presented as a spin-off of the original TCP project. Here, the original program is described in its adjusted form.

**II. OBJECTIVE OF THE ASSISTANCE**

The described objective remains the same; emphasis is put on the immediate achievement of a sustainable monitoring system over the entire country, to get proper information about circulating AI viruses continuously. Second objective is to develop a contingency plan, to be used in case of new outbreaks in the future. Third, vaccine efficacy evaluation capacity to be carried out.

**III. PROJECT OUTPUTS**

1. Monitoring plan - A surveillance action plan will be started to deal quickly and effectively with new outbreaks when and where they occur.
2. Contingency plan - Epidemiologically based strategies will be prepared for immediate control of virus circulation in infected areas.
3. Government laboratories will be strengthened to effectively do the monitoring; Field staff will be trained.
4. Government laboratories will be strengthened in the evaluation of vaccine quality.

The capacity to control outbreaks of HPAI in a safe manner is strengthened.

**IV. WORKPLAN**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Main activities Project month** | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 |
|  |  |  |  |  |  |  |  |  |  |  |
| **Output 1 Monitoring plan** |  |  |  |  |  |  |  |  |  |  |
| Fact finding, network building |  |  |  |  |  |  |  |  |  |  |
| Lab testing |  |  |  |  |  |  |  |  |  |  |
| Analysis |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Output 2 Contingency plan**  |  |  |  |  |  |  |  |  |  |  |
| Develop plan |  |  |  |  |  |  |  |  |  |  |
| Provide equipment |  |  |  |  |  |  |  |  |  |  |
| Training staff |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Output 3 Strengthen Lab and field staff** |  |  |  |  |  |  |  |  |  |  |
| Provide equipment |  |  |  |  |  |  |  |  |  |  |
| Provide materials |  |  |  |  |  |  |  |  |  |  |
| Train staff |  |  |  |  |  |  |  |  |  |  |
|   |  |  |  |  |  |  |  |  |  |  |
| **Output 4 Enhance vaccine evaluation capability** |  |  |  |  |  |  |  |  |  |  |
| Provide materials |  |  |  |  |  |  |  |  |  |  |
| Train staff |  |  |  |  |  |  |  |  |  |  |
| Analysis data |  |  |  |  |  |  |  |  |  |  |

**Time schedule of inputs**

 Int cons. Nat. cons. Vaccine cons.

Week 8- Fact finding mission vaccine control X

W 9- Initial mission, fact finding, proposals X X

W 10- Idem X X

W 11- Idem, contingency plan X

W 12- Purchase materials / distribute X

W 13- Training field staff and labs X

W 14- Idem X

W 15- Start field monitoring X

W 16- Support to monitoring X

W 17- Virus production/ reference lab X X X

W 18- Epidemiology Karachi X X X

W 19- Idem X X

Month 5- Surveillance and support X

M 6- Idem X

M 7- Idem, evaluation of the achieved (X) X

M 8- Idem X

M 9- Idem X

M 10- Idem X
M 11- Analysis, evaluation and reporting X X X

Thus, after the start up of monitoring in the field in week 15, a four week cycle is achieved, where only once every four weeks, central testing, administration and data analysis has to be done. In week 25, when two cycles have passed, the plan will be evaluated.

**V. CAPICITY BUILDING**

National expert gain capacity for field workers, regional and central labs. Laboratory capacity is enhanced for diagnosis of avian influenza and other poultry diseases. Technology is transferred for production and use of quality assured avian influenza vaccines.

**VI. INPUTS TO BE PROVIDED BY FAO**

**Personnel**

 International experts ($ 22.050)

- One international consultant in veterinary epidemiology will analyze the spatial and temporal occurrence of AI outbreaks and seroprevalence. He will support the realization of a contingency plan and give support to all activities of the national consultant.

- One international consultant in vaccine production quality will support veterinary labs, both state-owned and private, to enhance quality of vaccine production, bio-security and bio-containment. He will support the National reference lab to fulfill their task.

Technical Cooperation between Developing Countries ($ 1.500)

- Gives technical support on GIS and mapping technology from a central desk (not on site).

FAO advisory and supervisory technical services ( $ 22.476 )

National experts ($ 25.900)

- One national consultant will assist FAO and counterparts with the implementation of the project and to train laboratory workers. (Ten work months)

- One national communications consultant will assist counterpart staff to prepare, create and perform training to farmers and field staff. (On WAE basis, three work months)

**Travel ( $ 38.000 )**

**General operating expenses ($ 18.560)**

**Expendable equipment ( $ 135.000 )**

See below for specification.

**Direct operating expenses ($ 25.514)**

**Training ($ 11.000)**

**Some changes have been proposed in budget under, consultants, and travel; the rest of the financial figures of the original project can remain unchanged.**

**The budget for expendable and non-expendable equipment can be specified as follows**:

*Non-expendable equipment:*

Micropipette set (1000ul, 100 ul, 20 ul) 3x 7 7.000

Multi-channel Pipettes (5-50 ul), 8-chennel x 5 5.000

Buffer troughs x 25 100

Table Top Centrifuge (china) x 5 1.000

Hotplate and stirrer (china) x 5 600

Top loading balance x 2 2.000

PH meter with stand x 4 3.000

Vortex (china) x 2 500

Reflecting mirror (local) x 4 200

Water bath (china) x 4 800

Computer 1PC+ 1 lap-top + 2 printers+ 2 scanners

Plus 1 fax and 1 small copier 11.000

GIS software 2.500

Freezer (local) x 4 1.700

Refrigerators x 2 1.300

AGPT well making moulds x 12 200

Distillation plant (glass) x 2 1.400

Autoclave (local) x 2(small) 300

Dist.Water autoclavable containers 10L x10      1.000

Light source for AGPT reading (local) x 5 200

Lab scale lypholizer x1 15.000

Refrigerated Microfuge x1 5.300

Egg incubator (small), local x1 2.000

Incubator (Bacteriology) small x2 1.500

Chicken isolator, medium x1 18.000

Incinerator x1 3.000

Disinfectant sprayer x150 4.000

Containers x100 1.000

**Total $ 90.000**

 *Expendable equipment*

Media, buffers, photo-films 13.400

Disposable plastic ware (syringes, vials, tips, tubes, etc) 15.000

Antigens and antisera (for immunoassays) 20.000

Reagents (PCR primers, PCR kits, etc.) 18.000

Glassware (flasks, bottles, pipets, jars, test tubes) 6.000

Shipment boxes, packing material 3.000

Stationary,  5.000

SS usable (Scissors, burners, tube-racks, trays, etc) 2.000

Chemicals for virus isolation/typing 30.000

SPF eggs 7.000

Exp. Chickens and feed 4.000

Non fog goggles x 50 500

N95 masks, medium x100 500

Glove, Disposable x 100 500

Rubber boots M and L x 100 500

Coveralls x100 850

Glove elbow x 100 1.000

Disp bags x 5000 1.000

Disinfectant virocide 50 l. 750

Sampling Kits (gloves, swabs, masks, boot cover, etc) 5.000

Repair of equipments 5.000

**Total 135.000**

**Proposal for an epidemiological survey in Karachi, in order to eradicate Avian Influenza in an overcrowded South Asian Area**

**I. BACKGROUND AND JUSTIFICATION**

The FAO project TCP/PAK/3002 (E) is limited in time and budget. The main objectives are to achieve a monitoring plan, a contingency plan and to enhance vaccine quality control.
The complex situation in and around Karachi brings the need for a more intensive approach there. The Karachi environment is highly at risk for AI virus circulation and outbreaks, with potential risk to human health. In Karachi, AI virus strains H7 and H9 are probably present, and eventually, HPAI. Poultry estates, where many smallholders have conglomerated, are situated close to a large, densely populated area, with an estimated population of 13 million people. Hygienic standards are poor, many wild birds are found, including migratory birds. Therefore, this proposal is presented as a project in itself, a spin-off of the original TCP project. The Karachi province could be a model for any densely populated area in Asia, where AI infection in poultry is difficult to control.

**II. OBJECTIVE OF THE ASSISTANCE**

To perform a thorough epidemiological study in and around Karachi, in order to obtain knowledge about the pathways of virus circulation and about the feasibility of AI control/eradication, using AI vaccines and bio-security as tools.

**III. PROJECT OUTPUTS**

* Knowledge about virus circulation pathways
* Enhanced bio-security in the Karachi province
* Better understanding of hygiene by farmers and others
* Knowledge of the role of vaccination and the feasibility of AI eradication
* Eradication or control of AI in the Karachi province
* Model for similar situations in other densely populated parts of Asia
* Reduced risks to human health in Pakistan and parts of Asia

**IV. WORKPLAN FRAME**

The plan can start as soon as a sufficient local vaccine production of acceptable quality is guaranteed (commercial vaccines can be considered).

1. MAKE AN INVENTORY OF THE REGION, GIS MAPPING.MONITORING AND SURVEY
2. ENHANCE BIOSECURITY
3. INTERVENTION
4. CONCLUSIVE TESTING AND RE-POPULATION

1. The poultry estates in and around Karachi are identified based on recent outbreaks of AI in a chronological order. Starting with poultry estate 1, all individual poultry sites are visited. Their exact location is GP plotted. Map is drawn. Questionnaire is completed (see Annex 4). Samples are collected for laboratory testing.
Relevant sampling and testing is done in the surroundings, within and around the state. Wild birds, doves and other relevant animals are included in the testing. Blood samples are collected from people that have recently been at risk of infection with AI virus. Farmers receive basic information on hygiene standards.
2. All possible virus transmission pathways between the poultry estate and the outside world are summarized. Every pathway is evaluated and controlled as far as possible. This includes motivating contacts with contractors, transporters, feed millers, processors and tradesmen.
3. Where AI H7 virus or seroconversion is found or where HPAI outbreaks have occurred, culling is considered and executed as far as possible. Isolated virus strains have to be characterized. All other flocks are vaccinated, broilers inclusive. Layers and breeders are vaccinated twice, at four weeks interval. At all sites, during vaccination, a standardized number of birds remain unvaccinated as sentinels, and they are tagged for ease of identification.
4. Four months after the last vaccination, all sentinels are sampled. If no positives are found, re-population of the culled flocks is accepted.

The working plan is performed for each poultry estate subsequently, until all sentinels are found to be negative.

This program is fulfilled for all poultry estates in and around Karachi.

**V. ROUGH APPROACH TO ESTIMATE LABOR AND COST**

As it is unknown what the exact extent of the five poultry estates is, in and around Karachi, only a rough estimate can be made on the extent of the proposed project. In the Karachi province as a whole, there must be some 8 million layers, 10 million broilers and 26 million backyard chickens.

If an average size estate is considered and if all farm sites are to be visited, this would lead to 750 visits. As hygiene procedures have to be taken seriously, one person could do up to an average of four visits per day. To fulfill this mission within a reasonable span of time, up to four weeks, one would need about 10 skilled field workers. In addition to this, one worker is needed in order to visit backyards and other relevant sites. After initial visits, a second visit has to be made to start up vaccination and tag sentinels. A third visit is needed to do the final sampling on the sentinels.

 Not all of the vaccinated flocks will have to be provided with sentinels. If sentinels are placed on 10% of the farm sites in total, this means 78 visits to tag sentinels and 78 final visits to sample the sentinels. This is work for two times two weeks for four workers.

If 75 % of the flocks will be vaccinated in total, layers to be vaccinated twice, 21 million doses will be needed during five months. Therefore, a weekly production is needed of about 1 million doses. Generally, SPF breeding eggs are needed for this. If SPF eggs are purchased,

(13.000 eggs a week will be needed), total cost will be $ 275.000. Initial sampling does not have to be done at each site. If 50% of the sites will be sampled, on an average of 5 sera plus 5 cloacal swabs per site (small flocks), this leads to some 2000 sera and 2000 swabs, for each estate. From backyards and other material, some 1000.
The processing and testing procedure is as indicated in Annex 3.

**The cost calculation** (in US $)

- training field workers 50.000

- labor field workers (11 field staff workers, during 1.5 years) 250.000

- hygiene materials (three visits on all farms) 75.000

- culling 250.000

- sera testing, antigen specification, virus isolations 500.000

- vaccine production, SPF eggs 275.000

- consultants: epidemiology, communication and GIS 150.000

- project management , travel and overhead 350.000

 **Total 1.900.000**

**VI. TIME SCHEDULE**

Visits to all estates will take five months. Three visits will be needed (intake, vaccination, final sampling). This will take 15 months in total. There are three stages in the process: inventory, intervention and conclusive testing. These stages are passed during the time needed to visit the estates: 15 months. In addition to this, two months are needed for initiating actions and training at onset. To close the project, two months are needed for analyzing, evaluation, and reporting. Duration of project: 19 months.

**VII. FUNDS**

As the present TCP project does not provide the budget needed for such a project, alternative funds are needed. Whereas the benefit of human health is a major target of the project, relevant organizations in this respect might be addressed. In additional to this project proposal, there is the need to strengthening the capability of virus characterization in Pakistan. This might be presented in a separate

**MISSION PROGRAM**

(All visits and discussions were done in close relationship with Mr. Khalid Naeem, National Project Consultant).

Monday, 23-02-04

* Introduction to FAO main office in Islamabad. Start up meeting with Mr. Omar Salah Ahmed, Mr. Syed Mohammed Ali, Mr. Khalid Naeem, NARC (National consultant) Report and explanation of the situation on Avian Influenza in Pakistan-developments.
* Discussions with with Mr. Ivo Claassen on his report on the position of vaccine production in Pakistan.
* Meeting with Mr.Raja, Animal Husbandry Commissioner, CVO. Explanations on
the position of the mission.

Tuesday 24-02-04

* Visit to the National Agricultural Research Centre, Islamabad.
* Meeting with Mr. Michel Dale, EU, Chief of the Development Centre.
* Attend training workshop: Disease Early Warning Systems (Pakistan Veterinary
Pharmaceutical Association / National Institute of Health).
* Meeting with Mr. Tony Williams (Project Strengthening Livestock Services).
* Transfer to Karachi,

Wednesday 25-02-04

* Meeting with Mr. Junejo, Director-General of Sindh .Visit Poultry Research Institute (PRI), Karachi. Visit Sindh Poultry Vaccine Centre, meeting with Mrs Safquat Rehmani. Visit farm site with Mr. Shakir, Korangi; interview and discussion with local farmers. Visit farm site with Mr. Riaz, Korangi; sampling. Meeting with Mr. Khalil Sattar, CEO, K& N Chicken (Frozen Chicken producer).

Thursday 26-02-04

* Meeting with Mr.Aslam Jalali and Mr. Malkani from PRI, Karachi.
* Meeting with the Board of Pakistan Poultry Association. ( Mr. Patel, Aslam, Sattar, Siddiqui, Hashmi, Irfan)Visit K&N Veterinary Diagnostic Centre; discussion with Mr Qureshi and Mr. Arshad.

Friday 27-02-04

* Meeting at PRI with Mr. Jalali and Mr. Malkani: inventory, planning.
* Visit at rendering plant, fishmeal production APC. Mr. Riaz and Mr. Shakir: collecting further information and samples.
* Meeting with Mr. Junejo and Mr. Sahto at the DG’s office: short reporting and discussion.
* Visit Mr. Aslam; discussion on vaccine titers and effectiveness.
* Return to Islamabad.

Saturday 28-02-04

* Meeting in Rawalpindi, Mr. Bashir Bhatti, Director-General, Livestock and Poultry Department of Punjab and Mr.Shams ul Hassan, Director, Poultry Production and Research Institute.

Sunday 29-02-04

* Visit local market and poultry slaughtering facility in Islamabad.
* Impressions of local poultry farming around Islamabad.

Monday 01-03-02

* Meetings with FAO Representatives and Consultants: Mr. Manzoor and Mr. Mariner.
* Development monitoring plan.

Tuesday 02-03-04

* Consignation on behalf of Ashura, Muharram. Reading; administration.

Wednesday 13-03-04

* Meeting at Lahore veterinary institute with Mr. Saeed Ahmed. Visited Veterinary Research Institute.
* Meeting with Mr Zulfiquer Ali, feed quality consultant.
* Meeting with private producers, representatives of Pakistan Poultry Organization:

Dr. Kamal Mustafa, CEO of Big Bird Grand Parents Company, and Dr. Tehsin, CEO of Top Ten poultry company; Dr.Abdul Kareem, Technical Director, Big Bird Co., and Dr. A Leem Bhatti, Associate Professor at the University of Veterinary and Animal Sciences, Lahore.

* Visit Big Bird, private laboratory.

Thursday 04-03-04

* Meeting with Mr.Nasim Akhtar, Director, Animal Sciences Institute, NARC.
* Meeting with Crisis Management Committe AI, Islamabad.
* Short communication with Mr. Mohammed Afzal, Pakistan Agricultural Research Council.
* Discussion with regional representatives of the Pakistan Poultry Organization: Mr. Sadiq, Mr. Sarosh Akram and Mr.M. Aslam.

Friday 05-03-04

* Visit Peshawar. Dr. Muqarab Ali Khan, Director of Livestock and Dairy Development NWFP, Dr. Sher Khan, Disease Investigation Officer and head of the lab., Dr. Ayaz; from Abbotabad laboratory under VRI-Peshawar.

Saturday 06-03-04

* Meeting with Mr. Qurban Ali, National Veterinary Laboratory, Islamabad.
* Meeting with WHO, Dr. Birjees Mazher Kazi, Public Health Laboratories.

Sunday 07-03-04

* Writing of report.

Monday 08-03-04

* Presentation to Mr. Raja, discussion, adjusting the plan.

Tuesday 09-03-04

* Debriefing of FAOR, Islamabad.
* Meeting with Mr. Michael Dale, EU.

Wednesday 10-03-04, Thursday 11-03-04

* In transit.
* Debriefing at FAO Headquarters, Rome.

**Monitoring scheme, AI**. **FAO/ TCP program** Islamabad, 29-02-03

 Total monthly number of samples / test:

 (estimate)

**Basic instruction to regional institutes (5 x)**

1. Monitor 20 flocks / month, randomly identified\*: checklist + sampling. 100
2. Checklist: see annex 4 Sampling at random 10 sera +10 cloacal swabs.\* 1000 + 1000
3. Transports of samples to regional lab. (list of regional labs: see annex 5) 100
4. Pool cloacal swabs from each flock and freeze 100
5. Perform AGPT on each sera from unvaccinated flocks. 750
6. AGPT negative: reject and freeze. 650
AGPT positive: pool the positive sera from the same flock.
7. Do HI on both H7 and H9 in pooled sera. 27
8. If both H7 and H9 are negative, freeze pooled sera. 1
9. Send both swabs and all frozen sera monthly to NARC lab. 100 + 1000
10. Put all lab. Findings in excel database, communicate to NARC lab
11. Put checklist findings into excel database, communicate to NARC lab.

**Basic instructions to NARC lab**

1. Try virus isolation on each pooled cloacal sample 100
2. VI negative: reject 99
VI positive: determinate serotype completely 5
3. In frozen pooled sera: further HI testing. 10
4. Keep all sera frozen for at least one year.
5. Put all findings in database, communicate to relevant regional laboratory
and compile a monthly report for AHC office.

6- In case of outbreaks: give full assistance for diagnosis.

**Further actions**

1. National consultant has monthly meeting with AHC.
2. AHC decides about actions to be taken, about communication of results, in consultation with PPA.
3. Verifications by NARC lab on performance level of regional labs, working under this

project.

4- Quality control of different types of AI vaccine both local and internationally

 produced at National Veterinary Laboratory.

5- Epidemiological survey in Karachi and direct surroundings (see plan).

1. Make training program and instruction material.

 **Further recommendations**

* 1. Support program for culling in case of outbreak, including fund raising.
	2. Support regulations to guarantee basic bio-security in poultry production.

\* Randomly identified means: The location is randomly chosen out of regional office file. Based on the AI vaccination status of each flock, in order to include about 25% of vaccinated flocks.
At the identified location, just one house will be sampled. The numbers of samples will be 10, unless the flock size is below 1000. in that case, 1% of the animals will be sampled.

**ANNEX 3**

**CONTINGENCY PLAN**

Within the initial mission of the TCP project the overall setup of a contingency plan was discussed in general. Such a plan has to be developed, considering the following items. As a guideline the SANCO document 3637/99 (PVET/99/EN/3637.doc) is recommended.

**1- Legal basis**

 Notification has to be clearly defined and implemented in the regulations. This could
 be about HPAI, under the definition of the OIE. Suspected clinical cases should be
 under compulsory notification by the owner and the field veterinarian. There has to be
 a central incidence desk where positive cases will be recorded. There has to be a legal

 basis for culling (and compensation fund.) and for vaccination.
 **2Supplystation**
 A depot has to be installed to provide hygienic materials for immediate action in case
 of outbreaks. The depot can be installed in one central place. The materials can be
 purchased, using the TCP project budge. The depot has to be updated on a regular
 basis.

**3-Central incidence desk, crisis centre.**
 Once an outbreak is recorded, first actions will be taken at the central incidence desk.
 Information and orders to local authorities, to realize immediate stand-still within a
 radius of 3 km. Initiate an emergency mission, using the supply station materials. The

 mission is to collect information and samples for laboratory testing. Based on the

 findings of the mission, decisions are made about protection to humans about culling,

 further screening, tracing and ring vaccination. Further actions have to be taken at

 provincial DG level, where a crisis centre is in place. This centre is responsible for

 coordination of further AI control actions.

**4-Protection** to humans
 Vaccinations and antiviral drugs have to be given to all people at risk.

**5-Culling**
 For each site to be culled, one local coordinator is appointed. He will take care of
 hygienic procedures, material supply, people management, technical instructions,
 administrations and reports. Proper culling, under the given circumstances, will be by

dislocation of the neck. Dead birds, together with all eggs, will have to be buried

directly at the site, after disinfection. All manure is collected and buried at the farm.

Finally, the site has to be cleaned and disinfected superficially. After this, the site is

closed for at least four weeks.

**6-Vaccination Ring**

 vaccination is performed within a radius of 3 km and in all contact flocks,
 found in tracking and tracing. Vaccine is recruited from homologous strains as far as
 possible. New homologous vaccine production has started at government vaccine
 production sites.

7- Release of infected areas
 After the four weeks period, following the culling and appropriate actions, the ban on
 each site can be released. A number of tagged sentinel birds are delivered and sampled
 after a six weeks period. If no seroconversion is noted, the site may be re-populated.

 **Tentative list of materials and supplies for contingency plan**

|  |  |  |
| --- | --- | --- |
| **Materials** | **Number** | **Cost in US $** |
| Non fog goggles |  50 |  500 |
| N95 masks, medium |  100 |  500 |
| Gloves, disposable |  100 |  500 |
| Rubber boots, M and L |  100 |  500 |
| Coveralls |  100 |  850 |
| Glove, elbow |  100 |  1000 |
| Disposable bags | 5000 |  1000 |
| Disinfectant virocid |  50 l. |  750 |
| Sampling kits |  100 |  5000 |
| Antiviral drugs set |  50 |  ? |
| **Equipment** |  |  |
| Disinfectant sprayer |  50 |  2000 |
| Container |  100 |  1000 |
| **Total** |  | **13600 + ?** |

**FARMSITE QUESTIONNAIRE AND CHECKLIST**

|  |
| --- |
| **CHECKLIST FARMSITE ITEMS, RELEVANT WITH RESPECT TO AVIAN INFLUENZA AND BIOSECURITY** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| District |   |   |  |   |   |   |  |  |  |  |  |
| Collecting station |  |  |  |   |  |   |  |  |  |  |
| Name of investigator |  |   |  |   |  |   |  |  |  |  |
| Date of sampling |   |   |  |   |   |   |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Farm owner |   |   |  |   |   |   |  |  |  |  |
| location adress |  |   |  |  |  |  |  |  |  |  |
| GP-code |  |   |  |   |  |   |  |  |  |  |
| Breeders, race? Number? |  |   |  |   |  |   |  |  |  |  |
| Broilers, race? Number? |  |   |  |   |  |   |  |  |  |  |
| Layers, rearing, race? Number? |   |  |   |  |   |  |  |  |
| Layers, production, race? Number? |   |  |   |  |   |  |  |  |  |
| Other type.? Number? |   |   |  |   |   |   |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Total Number of birds |   |   |  |   |   |   |  |  |  |  |
| Age of birds (weeks) |   |  |   |  |   |  |  |  |
| Multiple age? |   |   |  |   |   |   |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Mortality-cumulative |   |   |  |   |   |   |  |  |  |  |
| Mortality- previous week |  |   |  |   |  |   |  |  |  |  |
| Egg production % - cumulative |   |  |   |  |   |  |  |  |
| Egg production % - previous week |  |   |   |   |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| Distance to the next poultry farm |   |  |   |   |   |  |  |  |
| Distance to the next backyard poultry |  |   |  |   |  |  |  |
| Distance to an open lake |   |  |   |  |   |  |  |  |
| Distance to the litter belt |  |   |  |   |  |   |  |  |  |
| Distance to rendering facility |   |  |   |   |   |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| Water supply possibly from open water? |  |   |   |   |  |  |  |  |
| Own feed mill? |  |   |  |   |  |   |  |  |  |
| Fishmeal used? |  |   |  |   |  |   |  |  |  |  |
| Meat&bone meal used? |   |  |   |  |   |  |  |  |  |
| Return of dirty crates / boxes ? |   |  |   |  |   |  |  |  |  |
| Contracted customer? name. |   |  |   |   |   |
|  |  |  |  |  |  |  |
| Vaccinations:  | Influenza H7?  |  | Y / N  |  |  |
|   | Influenza H9?  |  | Y / N  |  |  |
|   | Pericarditis?  |  | Y / N  |  |  |
|   | Newcastle? |  | Y / N  |  |  |
|   | Gumboro? |  | Y / N  |  |  |
|  |  |  |  |  |  |  |
| Have parent flock been vaccinated against influenza?  |  |  Y / N |  |  |  |
| Have parent flock been vaccinated against pericarditis? |  |  Y / N |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Has this location been infected with influenza? When? Where was the onset of the disease? |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Were there recent outbreaks in the surroundings? (explain).  |  |
|  |  |  |  |  |  |  |  |
| Any reports or suggestions? (explain) |   |   |   |   |
|  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Undersignment |   |   |   |   |   |   |  |  |
|   |   |   |   |   |   |   |  |  |
|  |  |  |  |  |  |  |  |  |

NB: There will have to be an adapted checklist for backyard farmers

**LIST OF REGIONAL LABS**

- PUNJAB ---PRI Rawalpindi, (Sub-stations may be arranged at Diagnostic labs of

 University of Faisalabad, & University of Veterinary and Animal
 Sciences, Lahore), along with private labs

- SINDH ---PRI Karachi and private lab

- BALUCHISTAN ---VRI, Quetta (with reduced sample size) (not yet approached)

- NWFP ---VRI, Peshawar (with reduced sample size)

- Islamabad Cap.Terr. ---AJK (Kashmir) + Northern areas at NARC or PRI Peshawar or PRI
 Rawalpindi

**ANNEX 6**

**Terms of Reference**

**International Consultant – Field Veterinarians**

Under the general supervision of TCEO, the technical supervision of the Chief, Animal Health Service, FAO Headquarters, the direct supervision by the Lead Consultant – Animal Health and the FAO Representative in the country of assignment; in close collaboration with the Regional Animal Health and Production Officer, RAP, and in collaboration with the National Project Coordinators and other consultants, the International Consultant – Laboratory Disease Diagnosis will undertake the following activities:

1. Conduct a rapid assessment of the avian influenza A (and other) disease situation of poultry in one or more countries;
2. Assess the capacity of national veterinary services (and other units concerned) to respond to the current poultry disease situation;
3. Evaluate the coordination and working relationship between the Ministry of Agriculture and Ministry of Health/World Health Organization in response to the current poultry disease situation;
4. Give a debriefing report (oral and public as well as written draft) before leaving the country; and
5. Send a brief written report (by email) of findings, to Chief, AGAH and Hans Wagner, RAP for comments and clearance.
6. Facilitate sample submission from veterinary laboratories or field occurrence of AI to OIE/FAO Reference Laboratories (Wyebridge, Ames) and sample vaccines from field sources.

He/she will have level C proficiency in English.

**Qualifications:** The Field Veterinarians will have a veterinary degree from a recognized university and at least seven years of relevant experience with poultry or livestock disease diagnosis and control. Experience with poultry production and health is preferred. Experience in South or Southeast Asian countries is desirable.

He/She will have level C fluency in English.

**Duration:** 21 days including briefing and de-briefing at FAO HQ, Rome and international travel.

**Duty Station:** Islamabad, with in-country travel.

**Security:** Consultant must be aware of security phase of country of assignment and understand the implications for his/her own security. As soon as s/he arrives at the duty station, through the FAO Representation or directly s/he must contact the designated UN security officer to be briefed on all the recommended security measures. In case this procedure is not properly applied, the consultant may not be covered under the insurance.

**Vaccinations:** Consultant must ensure that he/she has received any necessary medical vaccinations/ medical care before departing from home address.