



**FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS
REGIONAL OFFICE FOR THE NEAR EAST
(RNE)**

**PRELIMINARY APPROACH TO CATALYZE
NEAR EAST SELF-SUFFICIENCY
IN VETERINARY VACCINES**

2002

I. INTRODUCTION

Enzootic animal diseases constitute a major obstacle for developing animal production in most countries of the Near East. Applying well designed relevant immunoprophylactic programs by using appropriate vaccines is an effective procedure for both prevention and control. In order to review the adequate availability of the different veterinary vaccines required to control various animal diseases in the individual Near East countries, a relevant questionnaire was prepared and distributed in 1998 by the Regional FAO Office for the Near East (RNE) to all the 25 countries of the region. Only 15 countries responded (Egypt, Iran, Iraq, Jordan, Lebanon, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Sudan, Syria, Tunis, Turkey and UAE). The received data was interpreted and reported to all countries of the region including those countries which did not respond to the questionnaire.

Out of the 15 countries which responded, 11 countries (Egypt, Iran, Iraq, Jordan, Morocco, Pakistan, Saudi Arabia, Sudan, Syria, Tunis and Turkey) are producing some types of veterinary vaccines. On the other hand, all the responding countries are partially or completely dependent on importation of various types of veterinary vaccines, mostly from sources outside the region.

Considering the types and total number of doses of both produced and imported vaccines by countries which responded to the questionnaire and comparing such quantities with the estimated actually required quantities to control many of the major enzootic diseases, it was concluded that much more types and/or quantities of vaccines are still required by these countries for appropriate application of successful control programs.

Depending on importation of veterinary vaccines produced in other regions of the world is sometimes risky. The antigenicity of pathogens used for producing such vaccines may be variable from the antigenicity of relevant field strains (e.g. FMD virus) causing animal diseases in the Near East. Therefore, the efficacy of using some of these vaccines in the Near East may be questionable. Furthermore, the expected enforcement of the GATT agreement in January 2005 may cause a considerable increase in the price of imported vaccines and/or may add further obstacles on the transfer of relevant technology required for upgrading or expanding vaccine production in the region. Therefore, it will be very important to get use of the still remaining last 2 years before the enforcement of this agreement to qualitatively and quantitatively develop the veterinary vaccine industry in the region and to stimulate the different countries of the region to use such developed vaccines instead of importing vaccines from sources outside the region.

Accordingly, the present follow-up study is designed to collect additional data needed for initiating possible coordination between the different countries of the region in order to stimulate the vaccine producing countries to upgrade and expand their production and to encourage the importing countries to use vaccines produced within the region.

The main objectives of the study are:

- Collection of data from the vaccine producing countries on the annual quantities (and prices) of the different types of locally produced vaccines (exceeding the national requirements) which are affordable for possible export to other countries in the region.
- Asking the vaccine producing countries: is it feasible to produce additional types of vaccines for the purpose of possible export to other countries within the region?
- Stimulating the vaccine production plants in the region to accept and facilitate the evaluation of their performance and potential viability by the relevant international agencies.
- Identifying the parameters currently requested by the Near East countries for veterinary vaccine importation to be considered by the exporting countries.
- Collection of data concerned with the annual amounts of different types of veterinary vaccines imported by each individual country in the region.

For this purpose, a relevant questionnaire was prepared in a simple manner in order to facilitate its completion by the relevant authorities of all countries in the region.

II. COUNTRIES TO WHICH THE QUESTIONNAIRE WAS DISTRIBUTED

Together with the report of the previous study (FAO-RNE (2000) : Preliminary Data on Veterinary vaccine Production / needs in the Near East Countries. pp. 52), the questionnaire was distributed in June 2000 by RNE to the veterinary authorities of all the following countries :

1. Algeria
2. Bahrain
3. Cyprus
4. Djibouti
5. Egypt
6. Iran
7. Iraq
8. Jordan
9. Kuwait
10. Lebanon
11. Libya
12. Mauritania
13. Morocco
14. Oman
15. Pakistan
16. Palestine
17. Qatar
18. Saudi Arabia
19. Somalia
20. Sudan

21. Syria
22. Tunis
23. Turkey
24. UAE
25. Yemen

III. COUNTRIES WHICH RESPONDED TO THE QUESTIONNAIRE

Despite the submission of several successive reminders to all countries delayed in sending their response to the questionnaire, 17 countries did not respond till the time of preparing this report (May 2002). Only 8 countries responded, five of which (Egypt, Iran, Jordan, Pakistan and Turkey) are producing veterinary vaccines and willing to export some of their products to other countries, while the other three countries (Iraq, Kuwait and Yemen) are willing to use vaccines produced by other countries in the region.

IV. INTERPRETATION OF THE OBTAINED DATA

Despite the lack of the required target information expected from the completed questionnaires and the variable concepts used by the local authorities to complete the questionnaires, the obtained data was useful for getting important preliminary conclusions on the changing status of vaccine production / needs by some Near East countries.

1. EGYPT:

Egypt produces veterinary vaccines in the Veterinary Serum and Vaccine Research Institute of the Agriculture Research Center, Ministry of Agriculture. The production covers many types of livestock, poultry and accompanying animal vaccines as well as different diagnostic reagents.

The address of the Institute is:
El-Seka El-Beda Street
Abbassia - Cairo
Egypt
Tel. +02/4821009 - +02/4821866 - +02/4821039
Fax. +02/2858321

During the last two years, additional types of vaccines were produced {e.g. Inactivated and Attenuated Bovine Ephemeral fever, Camel pox, Bluetongue, Inactivated Equine Herpesvirus, Infectious Laryngotracheitis (ILT), Avian Encephalomyelitis (AE), Turkey Rhinotracheitis, Egg Drop Syndrome, Duck Hepatitis, Rabbit Pasteurellosis and Feline Panleukopenia vaccines}. In addition many bi-valent and tri-valent vaccines were formulated. Some vaccines which were produced as experimental batches at the time of preparing the previous report are now routinely produced for field use (e.g. PPR and Lumpy Skin Disease vaccines).

Quantitatively, the provided data on the annual affordable vaccines for export had indirectly indicated that the amounts of many produced individual vaccines had considerably increased during the last two years. This supposition was concluded from the increase of the totally produced number of vaccine doses in 1997/1998 from 284 to 598 million doses of affordable vaccines in 1999/2000, i.e. at least 314 million doses increased (110%) within two years.

(a) **VACCINES AFFORDABLE FOR EXPORT:**

Egypt has considerable quantities of different vaccines and diagnostic reagents affordable for export. In addition, the country is ready to produce additional quantities of relevant biologics for further potential export. The given quantities of biologics affordable for export and the relevant quantities which could be additionally produced for further export are shown in Tables 1-3. The sale prices are not given.

On the other hand, the country is willing to export veterinary vaccines to other countries under the following conditions:

- Export will depend on the kind and amount of the required vaccine.
- The required vaccine will be dispatched 4 months after receiving the order. (It was not clarified, whether this condition is valid for the vaccines to be additionally produced for potential export or for the already affordable vaccines for export or for both).

There was neither positive nor negative response concerning the acceptance of the country to allow evaluation of the performance and the potential viability of the vaccine producing plant.

(b) **IMPORTED VACCINES:**

The data concerned with vaccine importation was provided by the General Organization for Veterinary Services (GOVS). Only the quantities of imported poultry vaccines during the years 1999, 2000 and 2001 were provided. The total amounts of different types of imported poultry vaccines had considerably increased from 3874 million doses in 1999 to 9803 million doses in 2000 and then jumped to 13482 million doses in 2001 (Table 4).

No data was provided on the possible importation of livestock, equine and/or accompanying animal vaccines.

Table 1. Quantities of livestock, equine and accompanying animal vaccines produced in Egypt which is affordable for annual export and the quantities of relevant vaccines and which could be additionally produced for further potential export.

Type of Vaccine	Number of doses (in millions)	
	Affordable for export	Additional Production
	Livestock Vaccines	
FMD (type O)	15	2
Inactivated RVF	8	2
Attenuated RVF	4	3
Rinderpest	12	2
PPR	6	0.5
Sheep & Goat Pox	4	3
Goat Pox	2	2
Camel Pox	2	2
Bivalent Lumpy skin	1	0.5
Combine Bovine Respiratory viruses (pneumo 3)	2	0.25
Inactivated IBR	0.25	0.25
Inactivated PI-3	0.25	0.25
Inactivated BVD	0.01	0.25
Inactivated Bovine Ephemeral fever	1	1
Attenuated Bovine Ephemeral fever	1	1
Attenuated Bluetongue (1-16 Serotypes)	1	1
Blackleg & Gas Gangrene	0.5	0.5
Lamb Dysentery & Pulpy Kidney	0.3	0.3
B.C. G.	0.025	0.025
HS (oil adjuvinated)	6	6
	Equine Vaccines	
Inactivated AHS (types 4 & 9)	0.5	0.5
Monovalent inactivated AHS (any type from 1 to 9)	0.5	1
Inactivated polyvalent AHS (all serotypes)	0.0001	0.05
Inactivated equine abortion	0.0001	0.05
	Accompanying Animal Vaccines	
Inactivated TC Rabies	0.1	0.1
Attenuated Canine Distemper	0.04	0.1
Attenuated Canine Parvovirus	0.02	0.02
Feline Panleukopenia	0.005	0.005

Table 2: Quantities of poultry vaccines produced in Egypt which is affordable for annual export and the quantities of relevant vaccines which could be additionally produced for further potential export.

Type of Vaccine	Number of doses (in millions)	
	Affordable for export	Additional Production
Newcastle HBI	100	100
Newcastle Lasota	100	100
Newcastle Komorov	150	150
Inactivated Newcastle (oil)	12	12
Inactivated Newcastle (Gel)	6	6
Gumboro (Bursa)	30	30
Gumboro (D78)	30	30
IB (H120)	20	20
Avian Reo	20	20
Fowl Pox	4	4
Avian Encephalomyelitis	0.1	5
ILT	0.1	5
Egg Drop Syndrome (EDS)	0.2	2
Bivalent inactivated ND+EDS	0.2	2
Trivalent inactivated ND+EDS+Gumboro	0.1	3
Bivalent inactivated ND + Gumboro	0.2	3
Bivalent inactivated ND +IB	0.25	3
Fowl Cholera	20	20
Oil adjuvanated infectious coryza	5	5
Duck Plague	20	20
Duck Hepatitis	20	20
Pigeon Pox	2	2
Pigeon Paramyxovirus	1	1
Turkey Rhinotracheitis	0.15	2
Inactivated Rabbit Hemorrhagic Virus	2	2
Rabbit Pasteruellosis (oil adjuvinated)	3	3
Rabbit Pasterurellosis (formalized)	3	3

Table 3. The quantities of diagnostic reagents produced in Egypt affordable for annual export and the relevant reagents which could be additionally produced for further potential export.

Type of Reagent	Affordable for export	Additional Production
RVF antigen for detecting IgG	200 ml	200 ml
RVF antigen for detecting IgM	200 ml	200 ml
Mammalian PPD Tuberculin (human)	1 million dose	1 million dose
Mammalian PPD Tuberculin (bovine)	1 million dose	1 million dose
Brucella tube antigen	5000 ml	5000 ml
Rose Bengal Brucella antigen	5000 ml	5000 ml
Rivanol Brucella Antigen	5000 ml	5000 ml
Buffered acidified plate Brucella Antigen	5000 ml	5000 ml
Milk ring test Brucella antigen	5000 ml	5000 ml
Polyvalent Salmonella Pullorum stained Antigen	5000 ml	5000 ml
Salmonella Typhimurium tube antigen	5000 ml	5000 ml

Table 4. Quantities of different poultry vaccines imported by Egypt during the years 1999, 2000 and 2001.

Type of Vaccine	Number of doses during the Year (in millions)		
	1999	2000	2001
Newcastle	2273	5835	7716
Gumboro	890	2386	3785
Infectious Bronchitis	379	738	1115
ILT	103	132	131
Marek's	52	348	404
Fowlpox	21	214	178
Avian Reovirus	20	40	32
Avian encephalomyelitis	10	31	33
Egg Drop Syndrome	18	17	31
Swollen head Syndrome	4	-	-
Fowl Cholera	32	16	11
Infectious Coryza	38	28	42
Mycop. Gallisepticum	7	18	4
Total	(100%) 3847	(255%) 9803	(350%) 13482

2. IRAN:

According to the previously collected data, Iran is the biggest veterinary vaccine producer in the Near East (Annual production in 1997/1998 was about 1886 million doses of various vaccines). The production is carried out in Razi Vaccine and Serum Research Institute which is also producing human vaccines.

The address of the Institute is:

Hessarak - Karaj

P.O.Box 11365

1558 Tehran

I. R. Iran

Tel. (+98-21) 3119708

Fax. (+98-21) 452194 or 454658

E-mail: A-Mohammadi@RVSRI.Com

(a) VACCINES AFFORDABLE FOR EXPORT

The country accepted to allow the evaluation of the performance and potential viability of its vaccine production plant.

Two parallel lists of vaccines affordable for export were provided in the completed questionnaire. One list was prepared by Razi Vaccine and Serum Research Institute in which the sale prices were given in US\$. The other list was prepared by Iran Veterinary Organization and the given sale prices were given in Rials without identifying the number of doses per price unit. Due to variations in the types and quantities of vaccines given in the two lists, all the obtained data from both lists are considered in this report.

(b) LIVESTOCK VACCINES AFFORDABLE FOR ANNUAL EXPORT:

i. Viral Vaccines:

FMD (Serotypes) ? (Trivalent: O,A,Asia 1 (Bivalent: O & A) (Monovalent: Asia 1)	22 million Doses 20 million Doses 5 million Doses 5 million Doses	200US\$/1000 Doses 220 Rials /? Doses 220 Rials /? Doses 220 Rials/?Doses
Rinderpest	12 million Doses 11.5 million Doses	45 US\$/1000 Doses 20 Rials/? Doses
Sheeppox	52 million Doses 65 million Doses	23US \$ /1000 Doses 12 Rials/? Doses
Goatpox	23 million Dozes 30 million Dozes	23 US\$/1000 Doses 12 Rials/?Doses

ii. **Bacterial Vaccines:**

Anthrax	82 million doses	45 US\$/1000 doses
	75 million doses	12 Rials/?doses
Blackleg	0.9 million doses	45 US\$ / 1000 doses
	1 million doses	50 Rials /? doses
Combined blackleg & HS Hemorrhagic Septicaemia	0.75 million doses	80 US\$ / 1000 doses
	41 thousand doses	66 US\$ /1000 doses
	300 thousand doses	120 Rials / ? doses
Enterotoxaemia	53.5 million doses	45 US\$ / 1000 doses
Polyvalent Enterotoxemia (B,C,D perfregance + Cl. Septicum)	40 million doses	90 Rials / ? doses
Agalactia (inactivated)	3.5 million doses	200 US\$ / 1000 doses
	4.5 million doses	180 Rials / ? doses
Brucella Melit. (Rev-1)	14.1 million doses	10 US\$ / 1000 doses
	17 million doses	35 Rials / ? doses
Brucella Abortus (strain 19)	774 thousand doses	18 US\$ / 1000 doses
	1.2 million doses	75 Rials / ? doses
Leptospirosis	50 thousand doses	1500 Rials / ? doses

iii. **Protozoal Vaccines :**

Bovine Theileriosis	410 thousand doses	800 US\$ / 1000 doses
	400 thousand doses	5000 Rials / ? doses
Ovine Theileriosis	10 thousand doses	400 US\$ / 1000 doses
	250 thousand doses	150 Rials / ? doses

(c) POULTRY VACCINES AFFORDABLE FOR ANNUAL EXPORT:

i. Viral Vaccines:

Newcastle Lasota	800 million doses	1.1 US\$ / 1000 doses
Newcastle HB1	585 million doses	1.1 US\$ / 1000 doses
Newcastle Lasota or HB1	2400 million doses	6 Rials / ? doses
Inactivated Newcastle	93.13 million doses	20 US\$ / 1000 doses
	150 million doses	26 Rials / ? doses
IB - H120	220 million doses	1.15 US\$ / 1000 doses
IB - H52	24 million doses	1.15 US\$ / 1000 doses
IB - H120 or H 52	350 million doses	7 Rials / ? doses
Fowl pox	58.5 million doses	4 US\$ / 1000 doses
	60 million doses	12 Rials / ? doses
ILT	43.2 million doses	3 US\$ / 1000 doses
	40 million doses	15 Rials / ? doses
Avian influenza	38 million doses	3.5 US\$ / 1000 doses
	100 million doses	176 Rials / ? doses

ii. Bacterial Vaccines:

Fowl cholera	3.7 million doses	40 US\$ / 1000 doses
	6 million doses	150 Rials / ? dose

(d) VACCINES TO BE ADDITIONALLY PRODUCED FOR FURTHER POTENTIAL EXPORT:

LIVESTOCK VACCINES:

i. Viral Vaccines :

Rinderpest	10 - 15 million doses	20 US\$ / 1000 doses
Sheeppox	10 - 15 million doses	23 US\$ / 1000 doses
Goatpox	10 - 15 million doses	23 US\$ / 1000 doses

ii. Bacterial Vaccines :

Anthrax	50 million doses	45 US\$ / 1000 doses
Enterotoxaemia	30 - 40 million doses	45 US\$ / 1000 doses

iii. Protozoal Vaccines :

Bovine Theileriosis	20 thousand doses	800 US\$ / 1000 doses
Ovine Theileriosis	20 thousand doses	400 US\$ / 1000 doses

POULTRY VACCINES

i. Viral Vaccines :

Newcastle (live)	300 million doses	1 US\$ / 1000 doses
Newcastle (inactivated)	20 - 30 million doses	20 US\$ / 1000 doses
IB (live)	200 million doses	1.15 US\$/1000 doses
Fowl pox	100 million doses	4 US\$ / 1000 doses
ILT (live)	10 million doses	3 US\$ / 1000 doses
Influenza (inactivated)	20 million doses	3.5 US\$ / 1000 doses

ii. **Bacterial Vaccines :**

Fowl cholera	10 thousand doses	40 US\$ / 1000 doses
--------------	-------------------	----------------------

(e) **VACCINES TO BE ANNUALLY IMPORTED :**

LIVESTOCK VACCINES:

Inactivated vaccines for
Bovine Rota- & corona-viruses
+ E. coli 50 thousand doses

EQUINE VACCINES:

Equine Influenza 30 thousand doses

POULTRY VACCINES:

i. **Viral Vaccines :**

Gumboro a quantity for 400 million birds
Different inactivated
poultry vaccines 140 million doses
Marek's disease 30 million doses

ii. **Bacterial Vaccines :**

Coryza 35 million doses

iii. **Protozoal Vaccine :**

Coccidiosis 6 million doses

3. IRAQ:

Although Iraq is one of the veterinary vaccine producing countries (as previously reported (production is carried out in the semi-privatized: Kindy Veterinary Vaccine Company, Abu Gharib, Baghdad), the received response did not indicate any possibility for exporting the Iraqi products to other countries of the region. On the other hand, the country is in need for importation of the vaccines listed below.

(a) Livestock (and accompanying animal) vaccines to be imported :

▪ FMD (without indicating the required serotype(s))	6.5 million doses
▪ Clostridial vaccines (without indicating the types)	5.0 million doses
▪ IBR vaccine	25 thousand doses
▪ Rabies	25 thousand doses

(b) Poultry vaccines to be imported :

▪ Infectious Bursal Disease (Gumboro)	60 million doses
▪ Marek's Disease	5 million doses
▪ Fowl Pox	8 million doses
▪ Infectious Bronchitis (IB)	3 million doses
▪ IB + Newcastle	3 million doses
▪ IB + Newcastle + Gumboro	5 million doses

The main parameters considered for veterinary vaccine importation from other countries in the region are:

- Using strains antigenically related to the locally prevalent field strains.
- Immediate availability in cases of emergency.

It seems that the country is self sufficient in using other essential vaccines (e.g. Newcastle, Sheeppox, Rinderpest, Blackquarter, Enterotoxaemia, anthrax, HS, Brucella, etc) which are possibly produced locally as previously reported. However, no response was given concerning the acceptance of the country for evaluating the performance and potential viability of its local Veterinary Vaccine Production Plant.

4. JORDAN:

Jordan is producing veterinary vaccines in "Jordan Vaccine Company (JOVAC)" which is a private company located near Amman. More types of vaccines were produced during the last two years (e.g. Camelpox, Pasteurellosis, Clostridial, Salmonellosis). A total of about 40 million doses of livestock vaccines and 160 million doses of poultry vaccines are affordable for possible annual export.

Neither negative nor positive response was considered for the paragraph of the questionnaire concerned with the acceptance of the country to allow the international evaluation for the performance and potential viability of its veterinary vaccine producing plant.

The questionnaire was completed by The Director of the Veterinary Department, Amman, Jordan.

Tel: 4126701 or 4126702

Fax: 4127901.

E-mail: vetjo@index.com.jo

TYPES, QUANTITIES AND RELEVANT PRICES OF VACCINES AFFORDABLE FOR EXPORT :

LIVESTOCK VACCINES:

i. Viral Vaccines :

Rinderpest	0.5 million doses	3 US\$ / 100 doses
PPR	2 million doses	4 US\$ / 100 doses
Sheeppox	1 million doses	5 US\$ / 100 doses
Goatpox	0.5 million doses	5 US\$ / 100 doses
Sheep & Goat Pox	5 million doses	5 US\$ / 100 doses
Camelpox	0.1 million doses	500 US\$ / 100 doses

ii. **Bacterial Vaccines :**

Brucella Melitensis (Rev-1, Full dose)	10 million doses	70 US\$ / 100 doses
Brucella Melitensis (Rev-1, reduced dose)	2 million doses	3 US\$ / 100 doses
Brucella Abortus (Strain 19)	0.5 million doses	100 US\$ / 100 doses
Anthrax	1 million doses	2.5 US\$ / 100 doses
Bivalent Pasteurella : P. mult. A+ P.haem.A1	10 million doses	4 US\$ / 100 doses
Trivalent Pasteurella : P. mult.A&B+P.haem.A1	5 million doses	4.5 US\$ / 100 doses
Bivalent Clostridial : Cl. perf C&D	0.5 million doses	4 US\$ / 100 doses
Trivalent Clostridial : Cl. perf C&D+ Cl.nov. B	0.5 million doses	5 US\$ / 100 doses
Quad. Clostridial : Cl. perf B,C&D + CL.nov.B	0.5 million doses	6 US\$ / 100 doses
Pent. Clostridial : Cl.perf. B,C&D+nov.A&B	0.5 million doses	7 US\$ / 100 doses
Hexa. Clostridial : Cl.perf. B,C&D+nov.A&B + septica	0.5 million doses	8 US\$ / 100 doses

POULTRY VACCINES:

i. **Viral Vaccines :**

Newcastle HB1	20 million doses	1 US\$ / 1000 doses
Newcastle Lasota	25 million doses	1 US\$ / 1000 doses
Newcastle I2 thermostable	5 million doses	1.2 US\$ / 1000 doses
Newcastle clone	25 million doses	1.2 US\$ / 1000 doses
IB H120	10 million doses	1 US\$ / 1000 doses
IB H52	5 million doses	1 US\$ / 1000 doses

Gumboro D78	25 million doses	1.2 US\$ / 1000 doses
Gumboro lukert	1 million doses	1.2 US\$ / 1000 doses
Fowl pox	1 million doses	7 US\$ / 1000 doses
IB + Newcastle HB1	10 million doses	1.25 US\$ / 1000 doses
IB + Newcastle Lasota	10 million doses	1.25 US\$ / 1000 doses
IB + Newcastle clone	10 million doses	1.25 US\$ / 1000 doses
Newcastle + Gumboro	5 million doses	1.25 US\$ / 1000 doses
Newcastle + IB + Gumboro	5 million dose	1.5 US\$ / 1000 doses
Inactivated Newcastle	1 million doses	10 US\$ / 1000 doses
Inactivated ND + IB	1 million doses	20 US\$ / 1000 doses
Inactivated ND + IB + Gumboro	1 million doses	40 US\$ / 1000 doses
Inactivated ND + IB + EDS	1 million doses	60 US\$ / 1000 doses
Inactivated ND + IB + Reo	1 million doses	60 US\$ / 1000 doses
Inact. ND + IB + Gumb. + Reo	1 million doses	100 US\$ / 1000 doses

ii. **Bacterial Vaccines :**

Salmonella gal. + Pullorum

5. KUWAIT:

Kuwait is not producing veterinary vaccines and is dependent on importation to cover its need of vaccine supplies. The questionnaire was completed by Dr. Mohammed Al-Muhanna, Director of Animal Health. His address is:

Animal Health Department
Public Authority for Agriculture Affairs for Fish Resources
State of Kuwait
P. O. Box 24122
Safat Code No. 13075
Tel. +(965) 4717123
Fax +(965) 4722417
E-mail: animhlth@hotmail.com

a. **VACCINES TO BE IMPORTED :**

The Public Sector in Kuwait is annually importing the following quantities of veterinary vaccines:

POULTRY VACCINES :

Newcastle	48 million doses
Infectious Bronchitis	60 million doses
Infectious Bursal Disease (Gumboro)	90 million doses
Fowl pox	2 million doses
Pigeon pox	3 million doses
Adenovirus (egg drop syndrome)	48 million doses

LIVESTOCK VACCINES :

FMD (serotypes O, A, C, Asia1 and SAT2)	60 thousand doses
Rift Valley Fever	1.5 million doses
IBR/IPV	17 thousand doses
Sheep and Goat Pox	1.25 million doses
Anthrax	50 thousand doses
Brucella Abortus (strain 19)	5 thousand doses
Brucella melitensis (rev-1)	1.25 million doses
Pasteurellosis	20 thousand doses

ACCOMPANYING ANIMAL VACCINES:

Rabies	6 thousand doses
Distemper, Parvo, Hepatitis, Leptospirosis	6 hundred doses
Feline Influenza (or Panleukopenia ?)	6 thousand doses

EQUINE VACCINES:

Equine Influenza	1700 doses
Tetanus	1700 doses

BIOLOGICAL PRODUCTS:

Immuno-stimulant	17000 doses
------------------	-------------

The main quality assurance parameters to be considered are:

- The product should be manufactured according to the relevant OIE standards.
- Reliability of the source in terms of :
 - Good manufacturing practice (GMP)
 - Licensed in the country where it is manufactured or in other countries
 - Availability of published literature on tests conducted on the product
- The vaccine should incorporate strains locally prevalent in the country/region.
- Validity of the expiry date.

6. PAKISTAN:

Pakistan is producing veterinary vaccine in 5 plants:

- The Veterinary Research Institute in Beshawer (North-West Frontier Province).
- The Veterinary Research Institute in Lahore.
- The Sindh Poultry Vaccine Center in Karachi.
- The Vaccine Production Laboratories in Balukhistan.
- The Poultry Research Institute in Rawalpindi.

Despite the low amount of annually produced vaccines as compared to the actually needed vaccines to control diseases among the huge numbers of local animals, Pakistan is willing to export a part of its products. In addition, the country is ready for evaluating the performance and potential viability of its veterinary vaccine producing plants.

The questionnaire was completed by the head of the Animal Husbandry Commissioner, Ministry of Food, Agriculture and Livestock, Livestock Wing,
Tel. +92 051 9205092
Fax +92 051 9221357
E mail: abc@lsb.paknet.com.pk

VACCINES AFFORDABLE FOR EXPORT:

Pakistan is willing to export the vaccines listed below.

i. Livestock Vaccines to be exported :

- | | |
|--|----------------------------------|
| ▪ FMD (without indicating the serotype(s)) | 0.1 million doses (20 Rb/dose) |
| ▪ Rinderpest | 1.5 million doses (4Rb/dose) |
| ▪ Sheep & goat pox | 0.12 million doses (5Rb/dose) |
| ▪ HS | 1.5 million doses (10Rb/dose) |
| ▪ Enterotoxaemia & lamb dysentery | 1.0 million doses (5Rb/dose) |
| ▪ Black quarter | 0.08 million doses (5Rb/dose) |
| ▪ CCPP | 0.75 million doses (0.75RB/dose) |

ii. Poultry Vaccines to be exported:

- | | |
|-------------------|----------------------------------|
| ▪ Newcastle | 5 million doses (0.25 Rb/dose) |
| ▪ Fowl pox | 0.08 million doses (0.25Rb/dose) |
| ▪ Avian influenza | 1.5 million doses (0.5Rb/dose) |

VACCINES TO BE IMPORTED:

Pakistan is willing to import the vaccines listed below:

i. Livestock vaccines to be imported :

- | | |
|---|-------------------------|
| ▪ FMD (without indicating the incorporated serotype(s)) | about 1.5 million doses |
| ▪ Rinderpest | " 3 million doses |
| ▪ CCP | " 0.5 million doses |
| ▪ Rabies | " 0.05 million doses |

ii. Poultry vaccines to be imported :

- | | |
|---------------------|------------------------|
| ▪ Newcastle | about 80 million doses |
| ▪ IB | " 60 million doses |
| ▪ Gumboro | " 50 million doses |
| ▪ Egg drop syndrome | " 70 million doses |
| ▪ Chronic Resp. Dis | " 40 million doses |

Pakistan is willing to import its need of veterinary vaccines from countries in the region if their products will fulfill the following requirements:

- The quality meets the international standards.
- produced by using strains antigenically related to the locally circulating field strains.
- Reasonable price.
- Importation should be based on agreements of bilateral trade.

7. TURKEY:

The questionnaire was completed by Dr. Huseyin Sumgur, General Directorate of Protection and Control.

Address: Akay cad. No. 3 Bakanliklar – Ankara – Turkey

Tel. 0090 312 4257789

Fax. 0090 312 4178209

E-mail: vet_service@kkgm.gov.tr

The country is ready to allow international evaluation for the performance and potential viability of its plants producing veterinary vaccines.

VACCINES AFFORDABLE FOR EXPORT:

i. Viral Vaccines :

FMD (monovalent : O Manisa, A Iran 96 or Asia1/TUR/73)	60 million cattle doses	0.20 US\$ per dose
Anthrax	2 million doses	0.10 US\$ per dose
Rabies Kelev	300 thousand doses	0.35 US\$ per dose
Rabies Semple	4 thousand doses	0.35 US\$ per dose
Rinderpest (attenuated)	5 million doses	0.50 US\$ per dose
Bluetongue-type 4 (attenuated)	2 million doses	0.50 US\$ per dose
Equine abortion	3 million doses	0.80 US\$ per dose
Contagious echthyma (ORF)	1 million doses	0.12 US\$ per dose
Sheep & Goat pox	10 million doses	0.12 US\$ per dose

ii. Bacterial Vaccines:

Paratuberculosis	1 thousand dose	0.50 US\$ per dose
Enterotoxemia (types C&D)	7.5 million doses	0.12 US\$ per dose
Infect. Necrotic hepatitis	2 million doses	0.12 US\$ per dose
Blackleg	1 million doses	0.20 US\$ per dose
CCPP	1 million doses	0.22 US\$ per dose
Botulism	100 thousand doses	0.60 US\$ per dose
Bacillary haemoglobinuria	100 thousand doses	0.60 US\$ per dose
Brucella melit. Rev 1(adult)	500 thousand doses	0.12 US\$ per dose
E. coli	10 thousand doses	0.12 US\$ per dose
Salmonella Abortus ovis	10 thousand doses	0.15 US\$ per dose
Contag. agalactia	2 million doses	0.17 US\$ per dose

iii. **Diagnostic and Biological Reagents :**

Br. Rose Bengal plate test antigen	50 liters	5 US\$ per ml
Br. tube agglutination test antigen	50 liters	0.52 US\$ per ml
Pullorum plate test antigen	100 liters	0.14 US\$ per ml
Myc. galisepticum (CRD) plate antigen	20 liters	0.34 US\$ per ml
PPD mammalian	50 thousand doses	0.25 US\$ per dose
PPD avian	50 thousand doses	0.25 US\$ per dose
PPD Johnin	25 thousand doses	0.25 US\$ per dose
Int. S. Mallein	50 thousand doses	0.25 US\$ per dose

VACCINES AND BIOLOGICS TO BE ADDITIONALLY PRODUCED FOR THE PURPOSE OF EXPORT :

i. **Viral Vaccines :**

FMD (monovalent)	15 million doses	0.2 US\$ per dose
Rinderpest	20 million doses	0.5 US\$ per dose
PPR	20 million doses	0.5 US\$ per dose
Bluetongue (type 4)	20 million doses	0.5 US\$ per dose
Equine herpesvirus 1	15 thousand doses	0.8 US\$ per dose

ii. **Bacterial Vaccines :**

Anthrax	3 million doses	0.1 US\$ per dose
Paratuberculosis	1 thousand doses	0.5 US\$ per dose

iii. **Biological Reagents :**

PPD mammalian	50 thousand doses	0.25 US\$ per dose
PPD avian	50 thousand doses	0.25 US\$ per dose
PPD Johnin	50 thousand doses	0.25 US\$ per dose
Int. S. Mallein	50 thousand doses	0.25 US\$ per dose

VACCINES TO BE IMPORTED :

Following the regulations of the Turkish free market economy, the private sector is importing the required veterinary vaccines while the relevant governmental authorities are responsible for granting the import permission, registration and quality control.

a) **The Average Amounts of Annually Imported Poultry Vaccines:**

Newcastle	838 million doses
ND+IB	72 million doses
ND+IBD	21 million doses
ND+IB+Coryza	1 million doses
ND+IB+IBD	34 million doses
ND+IB+EDS	10 million doses
IBD	898 million doses
IB	231 million doses
EDS	450 million doses
Fowl pox	4 million doses
Avian encephalomyelitis	8 million doses
AE+Pox	72 million doses
Marek's	72 million doses
Reovirus	680 thousand doses
IB+ND+SHS+IBD	652 thousand doses
IB+ND+EDS+SHS	3 million doses
IB+ND+EDS+ Coryza	2 million doses
SHS	6 million doses
Coryza	9 million doses
Salmonella	4 million doses
Coccidiosis	8 million doses

b) Animal Vaccines :

Rabies

159 thousand doses

8. YEMEN:

Yemen is not producing veterinary vaccines and is dependent completely on importation of its vaccine supply. The country is importing the vaccines according to the quality and price. If the vaccines produced by the Near East countries will meet such requirements (good quality and reasonable price), Yemen is ready to import such vaccines.

The government is responsible for importing sheep and goat pox as well Rinderpest Vaccines.

a) The Imported Poultry Vaccines :

The annual imported quantities of poultry vaccines are shown in Table 5.

Table (5): The annually imported poultry commercial vaccines

Types & Quantities of Annually imported Poultry Vaccines

1) Poultry Vaccine Imported by Yemen :

No	Vaccine	Diseases	Quantity/ dose
1	MA5 & Hitchner	N. Hitchner & Infectious Bronchitis	8,050,000
2	RISMA	Marek	1,900,000
3	IB & ND	Infectious Bronchitis & ND	1,876,000
4	SG 9R	S. Pallonarum	5,555,000
5	IB & G & ND	IB & Gumboro & ND	10,000
6	Gumboro D 78	Gumboro	36,840,000
7	AE 1143	Avian Encephalomyelitis	700,000
8	Coryza	Infectious Coryza	5,432,000
9	ND Clone 30	Newcastle	45,685,000
10	MA5 & Clone 30	IB & Newcastle	8,540,000
11	IB H120	Infectious Bronchitis	23,639,000
12	IB 491	Infectious Bronchitis	10,980,000
13	IB & ND	Infectious Bronchitis & ND	2,564,000
14	New Bronz	ND&IB	850,000
15	Bursine -2	Gumboro	2,920,000
16	New Bronz MZ	Mycoplasma G & ND & IB	157,000
17	ND Lasota	Newcastle	2,950,000
19	NCL B1	Newcastle	5,360,000
20	Lasota Bron NASS	Newcastle	4,720,000
21	IB3 & G & ND	IB & Gumboro & ND	123,000
22	EDS	Egg Drop Syndrome	90,000
23	REO INAC	REO	335,000
24	REO 1133	REO	403,000
25	REO & IB & G & ND	REO & IB & Gumboro & ND	140,000
26	POX INE	POX	300,000
27	Bronipra- ND	Newcastle	300,000
8	Hipratifus-AV4	Viral Arthritis	150,000
29	Bronipra -I	Newcastle	4,500,000
30	AE & Pox	Avian Encephalomyelitis & Pox	3,090,000
31	ND Hitchne	Newcastle	6,480,000
32	OVO-Diphthrin	Pox	350,000
33	IB MA5	Infectious Bronchitis	2,750,000
34	Cocci	Coccidia	500,000
35	PARACOX	Coccidia	200,000
36	IB D1466	Infectious Bronchitis	80,000
37	IB D 274	Infectious Bronchitis	80,000
38	VA VAC	Viral Arthritis	60,000

80 % of the imported vaccine was from Intervet co, - Holland

The other 20 % can be divided between

Hirra Co.	Spain
Govac	Jordan
Meriac	Italy
Fort DoDgy	USA

b) The Imported Livestock Vaccines :

1210370 doses of attenuated live sheep & goat pox vaccine were imported in 1999 from JOVAC, Jordan.

Due to the availability of a remaining stock of Rinderpest from the unused vaccine of the last year, no vaccine was imported in 1999.

20000 doses of blackleg vaccine (covexin tm8) were imported by the private sector in 1999 from Ireland.

20000 doses of FMD vaccine (without indicated the incorporated serotype(s)) were imported by the private sector from JOVAC, Jordan. It should be noted that Jordan is not producing FMD vaccine.

c) The Imported Pet Vaccines :

700 doses of rabies vaccine were imported from France for vaccinating dogs (500 doses) and cats (200 doses).

Comment:

The annual use of only 20 thousands of FMD vaccine in a country having about 1.4 million cattle, 3.8 million sheep and 3.3 million goats may indicate such small quantity of imported vaccine is used for some private farms without applying national campaign to control the disease.

V. OUTPUTS AND CONCLUSIONS :

Despite the limited number of countries which responded to the questionnaire (8 out of 25 countries), the obtained data had indicated:

- A. Some producing countries (e.g. Egypt, Iran and Jordan) are willing to expand their production of some types of veterinary vaccines for the purpose of export.
- B. The responding importing country (Kuwait and Yemen) are willing to import their veterinary vaccine supply from other countries in the region if the quality of such vaccines are meeting the international standards and the other relevant parameters.
- C. The vaccine producing countries are self-sufficient in limited types of veterinary vaccines, but are still dependent on partial or complete importation of many other vaccines.
- D. Despite the partial importation of certain types of veterinary vaccines by the vaccine producing countries, such countries are willing to export part of their production of such vaccines which are partially imported.
- E. On the other hand, the producing countries are self-sufficient in many other veterinary vaccines and can additionally produce adequate amounts for export (e.g. sheep & goat pox, Camel pox, Rinderpest, PPR, Rift Valley fever, etc.).

- F. Due to the variations in the types of produced vaccines in the different producing countries, it could be possible that the producing countries can exchange various types of veterinary vaccines (e.g. Jordan, Iran and Turkey can import Rift Valley, Lumpy skin diseases and/or Bovine Ephemeral fever vaccine from Egypt; while Egypt can import Brucella vaccines from these countries)
- G. Two out of the 5 responding vaccine producing countries did not responded to the paragraph of the questionnaire concerned with their acceptance for evaluating the performance and potential viability of their producing plants.

VI. RECOMMENDATIONS:

The absence of positive response of many Near East countries to 2 successive FAO questionnaires concerned with veterinary vaccine production/needs make it necessary to try another approach to obtain relevant complete data on this important subject. The alternative approach could be achieved through initiation of an official FAO/NER mission which can visit all or most countries of the region. The main objectives of this mission could be summarized in the following points:

- A. Collection of relevant essential data on major prevalent animal diseases in each country which should be mainly controlled by vaccination.
- B. Analyzing data obtained from the possibly ongoing surveillance and epizootiological studies on each disease in countries to be visited as well as on the currently applied control programs with special concentration on immunoprophylaxis (e.g. the types and quantities of used vaccines in relation to the target animal population; the nature of the applied program, the methods of evaluating the efficacy of vaccination, etc.).
- C. Identifying the possible source(s) of the required vaccines: locally produced or partially or completely imported; appropriate type to protect against the circulating field strains; quantity adequate for actual need, etc.
- D. Evaluating the adequacy of available resources required to apply effective vaccination program (e.g. trained personnel, salaries, funds for vaccine supply, transport, facilities, cold chain equipment, collection of samples for follow up evaluation, relevant laboratory facilities, etc.).
- E. Stimulating the concerned countries to initiate coordination with the neighboring countries in order to apply regional control programs for some selected transboundary animal diseases.
- F. For the vaccine producing countries, the mission can collect data on :
 - i. The types and amounts of the locally produced vaccines.
 - ii. Essential information on the details of the production of each individual vaccine (e.g. the used relevant pathogen strain, substrate, technology, attenuated or inactivated, quality assurance, etc.).

- iii. The possibility of expanding the production of some vaccines in order to cover the actual national needs and then for the purpose of export to other countries of the region.
- iv. Initiation of an evaluation system for the following elements of the performance of the vaccine producing plants :
 - Personnel.
 - Premises.
 - Equipment.
 - Production and in-process control.
 - Laboratory control measures.
 - Laboratory animal, quality, premises and care.
 - Quality assurance.
 - Labeling, packing, and distribution.
 - Containment practice.
 - Sanitation and cleaning.
 - Registration formalities for the producing and importing countries.
- v. Also, it will be possible to analyze the following elements of the potential viability of the vaccine producing plants :
 - Economics/ scale given volume and product portfolio.
 - GMP and consistency of production.
 - Historical ability and systems in place to access new technologies.
 - Credibility of quality and the power of National Control Authority.
 - Management structure.
 - Legal status and adequate autonomy.

Dr. Talib M. Ali Elam
Regional Animal Production and Health Officer, FAO/RNE
P.O. Box 2223 Cairo, Egypt.
Tel.: (20 2) 3361000 – Fax: (20 2) 7495981-3373419
E-mail : Talib.Ali @fao.org

Compiled and prepared by Dr. Samir M. Hafez