Terms in vaccinology.

1. A live vector vaccine: is a vaccine that uses a chemically weakened virus to transport pieces of the pathogen in order to stimulate an immune response. The genes used in this vaccine are usually antigen coding surface proteins from the pathogenic organism.

2. Recombinant vector vaccines: are experimental vaccines similar to DNA vaccines, but they use an attenuated virus or bacterium to introduce microbial DNA to cells of the body. “Vector” refers to the virus or bacterium used as the carrier. In nature, viruses latch on to cells and inject their genetic material into them.

3. A recombinant vaccine: is a vaccine produced through recombinant DNA technology. This involves inserting the DNA encoding an antigen (such as a bacterial surface protein) that stimulates an immune response into bacterial or mammalian cells, expressing the antigen in these cells and then purifying it from them.

4. Live virus vaccines use the weakened (attenuated) form of the virus. The measles, mumps, and rubella (MMR) vaccine and the varicella (chickenpox) vaccine are examples. Killed (inactivated) vaccines are made from a protein or other small pieces taken from a virus or bacteria.

5. A subunit vaccine presents an antigen to the immune system without introducing viral particles, whole or otherwise. One method of production involves isolation of a specific protein from a virus and administering this by itself.

6. DNA vaccination is a technique for protecting against disease by injection with genetically engineered DNA so cells directly produce an antigen, producing a protective immunological response. ... Research is investigating the approach for viral, bacterial and parasitic diseases in humans, as well as for several cancers.

7. A peptide vaccine is any peptide which serves to immunize an organism against a pathogen. Peptide vaccine are often synthetic and mimic naturally occurring proteins from pathogens.

8. A synthetic vaccine is a vaccine consisting mainly of synthetic peptides, carbohydrates, or antigens. They are usually considered to be safer than vaccines from bacterial cultures.
9. **Epitope vaccine**: The vaccine is composed of a protein that resides on the surface of the virus. This strategy can be used when an immune response to one part of the virus (or bacteria) is responsible for protection against disease.

10. **Reverse vaccinology** is a part of vaccinomics which starts with the genome of pathogen and is used for the predicting the epitope. Epitope prediction is the heart of reverse vaccinology.

11. **A conjugate vaccine** is created by covalently attaching a poor antigen to a strong antigen thereby eliciting a stronger immunological response to the poor antigen. Most commonly, the poor antigen is a polysaccharide that is attached to strong protein antigen.

12. **Reverse genetics** is an approach to discover the function of a gene by analyzing the phenotypic effects of specific engineered gene sequences. This investigative process proceeds in the opposite direction of so-called forward genetic screens of classical genetics.

13. **Forward genetics** (or a forward genetic screen) is an approach used to identify genes (or set of genes) responsible for a particular phenotype of an organism. Reverse genetics (or a reverse genetic screen), on the other hand, analyzes the phenotype of an organism following the disruption of a known gene.

14. **Monovalent vaccine**: Monovalent vaccine, a vaccine directed at only one pathogen.

15. **Monovalent antibody**: an antibody with affinity for one epitope, antigen, or strain of microorganism.

16. **Bivariant (or polyvalent)**: A vaccine that works by stimulating an immune response against two (many) different antigens, such as two different viruses or other microorganisms. For example, Cervarix is a bivalent vaccine that helps protect the body against infection with two different types of human papillomaviruses (HPV).

17. **Combination vaccines**: Some of the antigens above can be combined in a single injection that can prevent different diseases or that protect against multiple strains of infectious agents causing the same disease.

18. **Compound vaccine**: Compound vaccines include a variety of ingredients including antigens, stabilizers, adjuvants, antibiotics, and preservatives.
19. **Antigens:** Antigens are the components derived from the structure of disease-causing organisms, which are recognized as 'foreign' by the immune system and trigger a protective immune response to the vaccine.  

20. **Preservatives:** Preservatives are added to multidose vaccines to prevent bacterial and fungal growth. They include a variety of substances, for example Thiomersal, Formaldehyde, or Phenol derivatives.  

21. **Stabilizers:** Stabilizers are used to help the vaccine maintain its effectiveness during storage. Vaccine stability is essential, particularly where the cold chain is unreliable. Instability can cause loss of antigenicity and decreased infectivity of LAV. Factors affecting stability are temperature and acidity or alkalinity of the vaccine (pH).  

22. **Antibiotics:** Antibiotics (in trace amounts) are used during the manufacturing phase to prevent bacterial contamination of the tissue culture cells in which the viruses are grown. Usually only trace amounts appear in vaccines.  

23. Types of vaccine: There are many types of vaccines, categorized by the antigen used in their preparation. Their formulations affect how they are used, how they are stored, and how they are administered. The globally recommended vaccines discussed in this module fall into four main types: Live attenuated vaccines, Inactivated whole-cell vaccines, Subunit vaccines and Toxoid vaccines.  

24. **Route of administration:** The route of administration is the path by which a vaccine (or drug) is brought into contact with the body. This is a critical factor for success of the immunization. A substance must be transported from the site of entry to the part of the body where its action is desired to take place.
Vaccines against Common Respiratory viral diseases in chickens

Presented by

Prof. Dr. M. M. Amer

(Dept. of Poult. Dis., Facult. Vet. Med., Cairo University)
Introduction

- Viral respiratory disease are those viruses that affecting chicken respiratory system causing respiratory signs (sneezing, cough, nasal discharge, rales) of variable severity and variable mortality and morbidity as well as effect on egg production causing sever economic losses.

- It can be the main cause or required various complicating factors (Swollen Head Syndrome).
Purposes of vaccination

- Protection against aggressive endemic disease challenges.
- Hyperimmunize hens to maximize maternally derived antibody passed to the hatching progeny.
- Emergency vaccination (NDV).
- Immunization of breeder to avoid naturally infected hens during the period of production of hatching eggs.
- Eradication and control of endemic diseases (as Avian influenza).
Types of vaccines

- **Traditional Live vaccines:**
  - short life (except ILT vaccine)
  - need water stabilizer (except Marek’s vaccine).

- **Vector live vaccine:** produced by gene deletion mutants of a pathogenic parents organism (as recumbinant fol pox virus expressing genes to protect against AI or ND virus antigen.)
Types of vaccines

- **Inactivated vaccines:**
  - whole virus or bacteria combined with an adjuvant
  - used either subcutaneous or intramuscular. consist of two parts aqueous and adjuvant phase, the aqueous phase contains the antigen while adjuvant enhance bird’s response to the antigen
  - adjuvant technology developed progressively as not only mineral oil are used also vegetable, fish, and animal oils are used nowadays lowering viscosity of and increase immunogenicity of used vaccines.

- **DNA vaccines:**
  can achieve both humoral and cell mediated immune response, and are save as inactivated vaccine.
Avian Respiratory viruses

It including the following viruses:

1- Avian Influenza (AI).
2- Newcastle disease (ND).
3- Infectious Bronchitis virus (IB).
4- Infectious Laryngeotrachiitis (ILT).
5- Pneumovirus infection (Swollen Head Syndrome) in chicken.
6- REO virus infection (Respiratory Enteric Orphan).
Field Evaluation of vaccines against Respiratory viral diseases in chickens

1- Avian Influenza.

- Either low or highly pathogenic avian influenza (LPAI or HPAI), those LPAIV cause transient mild clinical signs and seldom cause mortality (except with complication) while HPAI cause severe disease with high mortality and morbidity may reach 100% in commercial or SPF chicks.
Vaccination against avian influenza

- Protection against AI is virus – subtype specific so it is of great value to use subtype specific vaccine or in another word autogenous vaccine as it is not applicable in the field to vaccinate all 16 haemagglutinin subtypes (Halvorson et al 1987).

- This was confirmed by (Suarez, et al.2006) who found that the main role of vaccination success against AI is matching of the vaccine and field strain to provide optimal protection including reducing shedding of the virus.
- FAO 2004 summaries the objectives of AI vaccination as follow:
  1- reduce production losses caused by disease.
  2- reduce risk of spread to animal & human.
  3- reduce virus shedding.
  4- to create barrier between infected and free areas.
  5- to help in the control and eradication of the disease.
Vaccination against avian influenza

- ChuanLing, et al. (2003) found that the use of inactivated AI vaccine provides protection against homologous HA virus.
- Ellis, et al. (2004) use of commercial H5N2 vaccine against field outbreak AI-H5N1 interrupts virus transmission together with strict biosecurity measures.
Vaccination against avian influenza

- When studying the efficacy of oil–emulsion H9N2 avian influenza vaccines it was found that this vaccine hinder virus shedding in the environment (Pour, et al., 2006).

- It was found that vaccination with conventional H5N9 vaccine suppresses shedding of challenge with HPAI H5N1 and prevent symptoms, and considered a tool to support eradication efforts (Terregino, et al., 2007).
Vaccination against avian influenza

- Egyptian field study for isolation, characterization at immunological and molecular levels with preparation of an inactivated autogenous vaccine from this isolates by (Bahgat et al. 2009), they concluded that local H5N1 isolate show 100% homology of both gene with previously published sequences of H5N1 isolates from Egypt and the middle east, also the prepared autogenous vaccine was highly immunogenic as when immunized commercial chickens it protect it from death and reduce viral shedding.
AI Vaccines in Egyptian market

- Vaccine in Egypt either H5N1, H5N2, H5N3 and H9N2
- H5N1: Egavet (Indonesian), Egyflu (Egyptian strain made in China), Hermon (Chinese), MEVAC (Dr. Magde Elsaid), Kemet (Chinese).
- H5N2: ELMERE, INTERVET, Bioimmune, Bourhinger "Volvac", Ceva, Egavet.
- H5N3: coming soon by FortDodge (Pfizer).
AI Vaccines in Egyptian market

- The difference between all companies in the efficiency in production and carrier including the quality of mineral oils and inactivators.

- Market leader is H5N2 Volvac then H5N1 (Herben by nageawad).
Proposal of suitable vaccination time

- **Broiler**: at 8-10 days of age either alone or combined with NDV.

- **Layers and breeders**: 
  - at 8-10 days of age
  - another dose at 45 days of age.
  - another dose 2-3 weeks before egg production.

- **Protective titer**: 
  - not less than $10^8$ EID50.
2- Newcastle disease (ND)

- it is an acute highly contagious viral disease caused by paramyxovirus, only one serotype.
- Virus strains either lentogenic (from which many live vaccines produced) or mesogenic (which cause typical signs of respiratory distress) or velogenic (which is typical virulent virus responsible for outbreaks of NDV virus).
Vaccination against ND usually protect birds from the more serious consequences of disease, but virus replivation and shedding may still occurs even at reduced level (Alexander et al. 1999).

Degefa et al (2004) report that ocular rout of live vaccine administration for live Lasota and HB1 vaccine is the most efficient as it induced the highest antibody titer and 93.3% protection from challenge followed by drinking water and the lowest antibody titer was spray technique with only 53% of chicks survived challenge.
Also when the economic point of view of live and inactivated oil adjuvant vaccines *Degefa et al (2004)* found that ocular method at 1- and 21- day- old chicks gave the highest revenue followed by drinking water method, in term of total coast the injection method is the highest coast followed by ocular method.

*Jackson and Underwood (2005)* stated that it is preferable to start with day-old vaccination method for priming using suitable live vaccine.
Cardoso et al (2005) study the interference between live ND and IB vaccine in broiler and explain that due to rapid replication of IB than ND and the interference against the same receptor in respiratory tract so it is suitable for separation of time of vaccination by three days minimum except if patent vaccine against both IB and ND.

Raghul et al (2006) found that 128 HI titer and above is protective against direct damage of the reproductive tract using lentogenic vaccine alone or combined with inactivated ND vaccine.
Jafari et al. (2008) found that garlic powder caused significant increase of total leukocyte count 14 days after ND vaccination also the antibody titer were higher on those receive garlic powder than non treated control group.

Bwala et al (2009) found that Avinew vaccine gave 100% protection from mortality against two challenge viruses in SPF chicks but not prevent infection and replication and the protective dose was 10(4.38) and 10(4.43) in GPMV and RCV; respectively.
Bautista-Garfias et al (2011) stated that L. casei induce beneficial effects on weight gain when compared with fruit extract on the other hand fruit extract induce higher humoral immune response.

Khalil and Khalafalla (2011) compare water sources used as vaccine diluent on immune response to ND vaccine efficacy, they found that vaccine diluted in bottle water had significantly better immune response followed by tap water then shallow well water then artesian well water and finally surface water.
## Live vaccines in Egypt

<table>
<thead>
<tr>
<th>Company</th>
<th>komarov</th>
<th>HB1</th>
<th>LaSota</th>
<th>clone</th>
<th>6/10 strain</th>
<th>Avenew VGGA strain</th>
</tr>
</thead>
<tbody>
<tr>
<td>company</td>
<td>SVRI</td>
<td>all</td>
<td>all</td>
<td>all</td>
<td>Seva</td>
<td>Merial</td>
</tr>
<tr>
<td>strain</td>
<td>mesogenic</td>
<td>lentogenic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>replication</td>
<td>respiratory</td>
<td>enteric</td>
<td></td>
<td></td>
<td>Mainly enteric in lesser extent respiratory</td>
<td></td>
</tr>
<tr>
<td>application</td>
<td>Injection only</td>
<td>Eye drop</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Spry</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>DW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of use</td>
<td>5-7 days</td>
<td>Starting 14 days</td>
<td>From 1 day</td>
<td>From 1 day</td>
<td>From 1 day</td>
<td></td>
</tr>
<tr>
<td>Immunity &amp; P.V.R.</td>
<td>High</td>
<td>good</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Concentration</td>
<td>Minimum $10^6$ /dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- High
- Good
- Low
Inactivated vaccines in Egypt

1- single

<table>
<thead>
<tr>
<th>Amount injected</th>
<th>Conc/dose</th>
<th>Company produce</th>
<th>positioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 ml</td>
<td>$10^8$/dose</td>
<td>INTERVET</td>
<td>For all type of production</td>
</tr>
<tr>
<td>0.3 ml</td>
<td>$10^8$/dose</td>
<td>Marial (imopest)</td>
<td>For all type of production</td>
</tr>
<tr>
<td>0.2 ml</td>
<td>$10^8$/dose</td>
<td>Boehringer (volvac)</td>
<td>Concentrated for all type of production</td>
</tr>
<tr>
<td>0.2 ml</td>
<td>$10^{7.6}$/dose</td>
<td>INTERVET</td>
<td>Not concentrated</td>
</tr>
<tr>
<td>0.1 ml</td>
<td>$10^7$/dose</td>
<td>MbL (ghannam)</td>
<td>Only broiler</td>
</tr>
</tbody>
</table>
Inactivated vaccines in Egypt

2- combined

- Used according type of production.
- either binary, triple, quadric, or combined of five viruses.
- **protective titer of ND vaccine**:
  - Broiler: not less than $10^{4.5} - 10^5$ EID50.
  - Layers and Breeders: over $10^7 - 10^8$ EID50.
Proposal for suitable time of vaccination in broiler

- usually 1\textsuperscript{st} vaccination using live lentogenic vaccine (HB1) takes place from 1 - days of age
- then repeated every 7-10 days of age (use lasota or clone at 17 day then 27 days of age.
- it is preferable to use suitable live vaccine when respiratory distress (colon, Vetapaste or Avenew).
- in endemic farms: 1\textsuperscript{st} vaccination takes place using live vaccine at 1-3 days of age then at 8-10 days of age administrate clone together with inactivated combined (ND+AI) or single ND inactivated vaccine
Proposal for suitable time of vaccination in layers and breeders

- Usually 1\textsuperscript{st} vaccination using live vaccine takes place at 8-12 days of age may together with inactivated combined NDV+GUMBORO.

- Another vaccination using inactivated NDV+AI takes place at 45-50 days of age.

- At 110-115 days of age (17 week) inactivated vaccine, in layers (contains IB+EDS+AI+NDV), while in breeders (contains AI+REO+EDS+IB+GUMBORO+NDV).

- May use live vaccine as spray during production according serological finding (HI).
3- Infectious Bronchitis (IB)

- It is common highly contagious viral disease caused by Corona virus which has several serotypes. Only chickens are susceptible.
- There are two forms of the disease either respiratory form or variant form (nephritis nephrosis syndrome).
- Respiratory form characterized by respiratory signs with variable mortality while variant form characterized by wet dropping, increase water intake, kidney affections (nephrosis, urolithiasis).
Vaccination against IB

- It should be considered that protection against IB varies according relatedness between vaccine used and virulent virus circulating in field (protect type).

- It was noticed that IB live vaccines interfere with replication of live attenuated Pneumovirus vaccines (Cook et al. 2001).

- Inactivated IB vaccines are widely used especially in layers and breeder prior the onset of egg production (Box et al. 1988).
Administration of inactivated vaccines either by intramuscular or subcutaneous route inducing serum antibody and provide protection to internal tissues, kidney and reproductive tract, also the use of this vaccines reduce the incidence of virus present in the respiratory tract of challenged chickens and so limit transmission to other susceptible birds (Ladman et al. 2002).

When studying the immune responses of broiler regarding different routes of administration of live IB vaccine, eye-drop methods was found to induce
- the highest antibody titers with the closest range \((\text{Talebi et al. 2005})\).

- Both live and inactivated virus vaccines are used in immunization against IB virus. Live vaccine (H120) used in broiler chickens and for the initial vaccination and priming of breeder and layers pullets and those live vaccines are variable in their pathogenicity according attenuating procedures \((\text{Huang and Wang, 2006})\)
Based on the fact that vaccine protect against the same serotype of virulent virus (protect type) the use of IB virus H120 vaccine was able to protect broiler against clinical signs after infection with virulent strain of the same serotype (Matthijs et al., 2008).

When use live IB vaccine (respiratory viral vaccine) within concomitant infection with H9N2 LPAIV causing exacerbates the severity and increase replication and shedding of the virus (Tavakkoli et al., 2009).
Vaccination against IB

- concerning the control of nephropathogenic strain of IB virulent virus it was found that administration of IB live Massachusetts strain vaccine at day-old chicks is efficient for prevent gout in broiler (nephropathic strains) especially when administrated by eye drop rather than drinking water rout (Singh and Neelesh Sharma, 2009).

- Zakeri and Kashefi, (2011) study the humoral immune response of broiler chickens to various live vaccines from different companies with same virus strains and found variation of antibody response even
same virus strains from different companies (Zakeri and Kashefi, 2011).

it was found that vaccination of one day old broiler Ross with H120 vaccine using spray rout resulting in sever post vaccinal reaction and should be used carefully (Douster et al, 2012).
Vaccines used either classical or variant:
- classical vaccines either live Mass strain H120 or inactivated.
- variant IB vaccines either live variant produced by Marial (IB88), and INTERVET (4/91) or inactivated variant produced by MEVAC.
proposal for suitable time of vaccination:

- **Broiler:**
  coarse spray at day one of age (or at day 7 in water) using classical live vaccine.
  then at 14 day using variant or classical live vaccine (preferable classical) in endemic area.

- **Layer or breeder:**
  as broiler beside use of inactivated vaccine at 20 days of age then 2-3 weeks before egg production.
It is an acute viral disease of chickens, pheasants, and peafowl caused by herpes virus.

Characterized clinically by marked dyspnea, coughing, gasping, and expectoration of bloody exudates with high morbidity and considerable mortality rate.

Most outbreaks in chickens occur in broilers more than 4 weeks of age or in mature or nearly mature chickens, although all age groups are susceptible.
Vaccination against ILT

- Vaccination against ILT virus generally used only in areas where the disease is endemic, otherwise can result in the occurrence of long-term carrier birds due to virus ability to enter a latent state in the sensory ganglia.

- The principle mediator of ILT resistance is the local cell-mediated immune response in the trachea (Fahey and York, 1990).
Vaccination against ILT

- the immunity against ILT can be provided by using live attenuated vaccines, unfortunately the egg adapted vaccinal strain associated with varies adverse effects most important is that increase virulence of vaccinal virus due to bird-to-bird back passage (Guy et al., 1991).

- also (Guy et al., 1990) found that the involvement of modified-live attenuated ILT virus (egg adapted) give possible evidence of possible reversion of vaccinal virus to virulence, although the virulence of all vaccinal viruses was low compared with field isolates.
Vaccination against ILT

- Pathogenicity study applied on two ILT vaccines on chicken embryo-origin and other tissue culture – origin, and when both passaged in SPF chicks the chicken embryo origin increased virulence while the TC origin is not. And after 10 serial passages the chicken embryo origin gain virulence compared to highly virulent strains circulating in field (Guy et al., 1991).

- Recombinant ILT vaccine is the most recent produced by deletion or alteration of genes coding for virulence factor producing mutant ILT virus capable for inducing protective immunity (Fuchs et al., 2005).
Vaccination against ILT

- Available commercially in U.S.A. recombinant fowl pox virus-vector vaccine for immunization of chickens against ILT virus by wing web inoculation at least 8 weeks of age (*Davison et al., 2006*).

- Study was conducted to compare the protection induced by live attenuated and recombinant viral vector vaccines against ILT in broiler chickens. It was noticed that embryo origin vaccine provided optimal protection and reducing the challenge virus in chicken vaccinated by eye drop rout while vector vaccine which applied in-ovo and s/c reducing to some degree clinical signs, and challenge virus replication in trachea (*Vagnozzi et al., 2012*)
Vaccination against ILT

- when studied the effect of route of administration of ILT virus on vaccine success it was found that drinking water cause vaccination failure in high proportion of chickens, on the other hand vaccine applied by eye drop route provide more uniform protection compared with spray, drinking water routes (*Fulton et al.*, 2000).
Field application in Egyptian market

- Available commercially in Egyptian market to types of live vaccines either tissue culture origin (Scherring) or egg adapted strain (Scherring, INTERVET, Fort Dodge).

- The tissue culture vaccine produced lower immune response than egg adapted strain on the other hand those tissue culture vaccines produce lower post vaccinal reaction compared to egg adapted strain.
Vaccination program applied only for layer and breeder and may in baladi and in some extent in broiler in endemic area.

We have to remember that when vaccine applied in one farm it is forbidden to stop vaccination in coming cycles (as we introduce alive strain in the farm).

Proposal for vaccination regimen:
- Broiler Baladi: only once at day 35 of age.
- Layer and Breeder: at 40th days of age start with tissue culture vaccine, then after 25-30 days (70-90 days of age) the second vaccination takes place.

usually 1st vaccination with tissue culture vaccine while second one may with egg adapted one.
5- Reo virus infection

- It is viral disease responsible for several pathological entities and susceptibility of chickens to infection decreased with advancing age, the virus is carried by eggs, airway or digestive tract and the main route of transmission is via ingestion of feed and water (Popp et al., 2010).

- The virus belonged to Genus Orthoreovirus has different serotypes responsible for different disease condition in chicken (Viral Arthritis/Tenosynovitis, Respiratory disease “Fahey-Crawley virus”, Enteric disease and Systemic infections).
Reo virus vaccination

- Potentiation of post vaccinal immune response to avian Reo virus was proved by using immunostimulatory effect of the natural product “Ergosan” administered to breeding hens (evaluated by lymphocytes proliferation and post vaccination antibody titers) *Catana et al.*, 2002.

- *Loon et al.* (2003) found that presence of maternal immunity in broilers does not preclude the successful protective immunization with attenuated live Reo virus vaccine at 1-day-old of age.
Guo et al., (2003) compare the safety and efficacy of an experimental and commercial Reo vaccines for in-ovo administration, the stated that in-ovo vaccination with commercial or experimental vaccines did not adverse hatchability of SPF chicks and both recovery and antibody response were delayed at least 3 days in birds receiving the experimental vaccine than commercial one.

El-Khair and Abdel-Baky (2004) proved that chicks immunized with binary ethyleneimine inactivated vaccine had a higher level of serum neutralizing antibody than those formalin-inactivated vaccine, however both vaccinated groups were protected when challenged with the virus.
Reo virus vaccination

- **Vasserman et al., (2004)** stated that Sigma C protein is the most variable protein in the virus and it induces the production of neutralizing antibodies (immunogenic part), also they clear up that Sigma C protein influence diversity on vaccination efficiency as they found that protein sequence of Sigma C protein of two virulent isolates was differ from the attenuated vaccinal strain (strain 1133).

- When monitoring the immune status of broilers derived from hens with variable age and antibody titer **Giambrone et al., (2007)** found that most flocks were well protected against challenge viruses and most protected are those chicks from younger hens and higher titers.
Reo virus vaccination

- Most recently *Wu et al., (2009)* suggested that the recombinant Reo virus vaccine Sigma C protein produced has the potential for large scale successful vaccination against ARV (Avian Reo Virus) in commercial poultry production.

- *Popp et al. (2009)* tested 201 IBD-REO inactivated vaccine effectiveness against IBD and avian reoviros is flu and recommended that this vaccine is effective for active immunization of laying hens (breeder) against both virulent virus infection.

- *Hoerr (2010)* report that some virulent Reo viruses has immunosuppression by produce atrophy of lymphoid organs and replicate in blood monocytes.
**Reo virus vaccination**

- **Atta et al (2010)** concluded that a booster revaccination with inactivated combined vaccine (IBDV+NDV+IBV+Reo virus) together with supplementation with prebiotic or probiotic of hens during egg production period, was a useful tool to keep the hens antibody titers in high level resulting in producing chicks with high maternal antibody titers and minimized the number of unprotected chicks.

- **Wan et al (2011)** study the immunogenicity of a DNA vaccine of avian Reo virus to eliciting antibody production six-day-old SPF chickens which were orally vaccinated with this vaccine then boastered 2-weeks interval, it was observed that antibody was generated 2 weeks after immunization which was significantly higher than control groups beside proved protection against subsequent challenge.
Field application in Egyptian market

- either live or inactivated vaccine and those live vaccines either used in drinking water (only Reo vaccine by Schering) or by injection (market leader is that produced by Intervet)

- Under Egyptian field this vaccine used in breeders only start first with live vaccine at 1st two weeks of age then another dose (using live vaccine) at 35-40 days of life then at 70 days of age use inactivated vaccine then another inactivated dose 2 to 3 weeks before egg production.
6- Swollen Head Syndrome (SHS)

- It is a disease seen in broiler chickens 4-6 weeks of age caused by pneumovirus associated with complicating agents such as E.coli and Mycoplasma gallisepticum as bacterial complication or Adeno virus, Reovirus, NDV and IB as viral complication including bad hygienic measures as the pneumovirus itself did not play a causal role in SHS pathology in commercial poultry flocks (Georgiades, 2011).
Swollen Head Syndrome (SHS)

- Also **ELatif (2004)** clarify that E.coli associated with Swollen head syndrom (SHS) in broiler chickens and suggested that hygienic measures should be implemented together with antibiotic treatment to eliminate E.coli – induced SHS in broiler in Dakhilia.

- In laying hens it was found that challenge virus could induce a drop in egg production accompanied by malformation of egg shells (**Sugiyama et al., 2006**).

- Both live and inactivated vaccines are available commercially and those live attenuated vaccine stimulate both systemic and local immunity in the respiratory tract of chicken and turkey (**Kehra, 1998**).
Swollen Head Syndrome vaccination

- Also live attenuated tissue culture vaccine is now available commercially in the market (Patnayak et al., 2005).

- In spite of that humoral antibody response is poor following primary live vaccination, birds may still be protected against challenge due to cell-mediated immunity in the respiratory tract (Lwamba et al., 2002).

- To obtain complete protection in breeding flocks against SHS inactivated vaccine should be applied at 16-20 weeks of life prior to production. Preferable to be primed with live SHS vaccine, taken in consideration that there is evidence that live infectious bronchitis vaccine can interfere with the replication of avian metapneumovirus live vaccines in chickens (Cook et al., 2001).
Recently a cold adapted strain of a MPV was evaluated as a vaccine and was shown to produce protection to challenge for up to 14 weeks post vaccination (Patnaya and Goyal., 2006).
Field application in Egyptian market

- used mainly in turkey but in chickens it was found in many farms it is not cost effective when used in chickens unless if serious problems occurs in the farm, however specialist who use it apply vaccination program in breeder only and use the inactivated vaccine only 2-3 weeks before egg production maybe primmed by live vaccine.
Conclusion and Recommendation

- Viral respiratory diseases is one of the main problems in poultry industry as it is incriminated in many serious conditions either alone or together with complicating factors including bacterial complications (such as high ammonia concentration in the farm, high stocking density and bad ventilation).

- In order to prevent and control this viral respiratory disease it is recommended to use vaccination as a main tools as proper vaccination program together with good application of it prevent this diseases completely.
Conclusion and Recommendation

- Also Correction of managemental procedure is of great value not only for prevent viral respiratory diseases but also for all poultry diseases as it prevent occurance of the disease or disease progress as well as decrease mortality and morbidity in susceptible flocks.

- Also it is recommended to diagnose the condition from all views start from field diagnosis parallel with laboratory diagnosis and use of a suitable medication for complicating microorganism and main cause.

- Finally it is of graet value to do not jump or anticipate the final diagnosis of the main cause until study it well from all arms and aspects.
Thank you