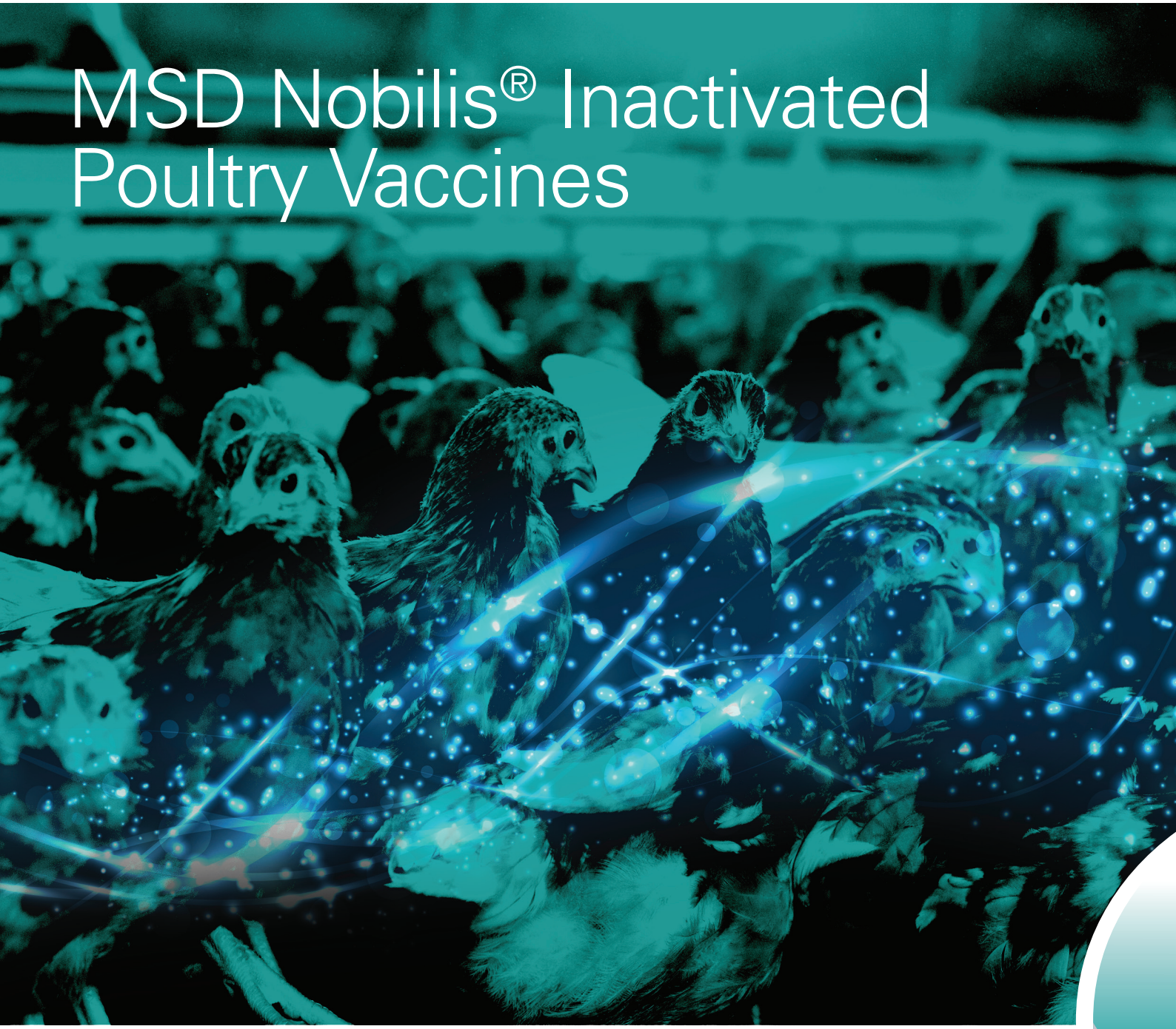
NOBILIS®

100 years | EXPERIENCE IN VACCINE R&D

MSD Nobilis® Inactivated Poultry Vaccines



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MSD Animal Health

Introduction

For more than a century, MSD, a leading global biopharmaceutical company, has been inventing for life, bringing forward medicines and vaccines for many of the world's most challenging diseases. MSD Animal Health remains one of the largest vaccine suppliers globally, providing an extensive range of protection for a variety of species. The Nobilis® inactivated poultry vaccine portfolio is one of MSD Animal Health's most comprehensive ranges.

Why inactivated vaccines?

Inactivated vaccines are used as part of the prime-boost approach in long live birds, where a live vaccine (the primer) is followed by an inactivated vaccine (the booster) that results in a longer duration of immunity. The purpose of the prime-boost approach in rear is to extend the duration of immunity in the birds through the production period without having to administer an excessive number of vaccines in the production phase.

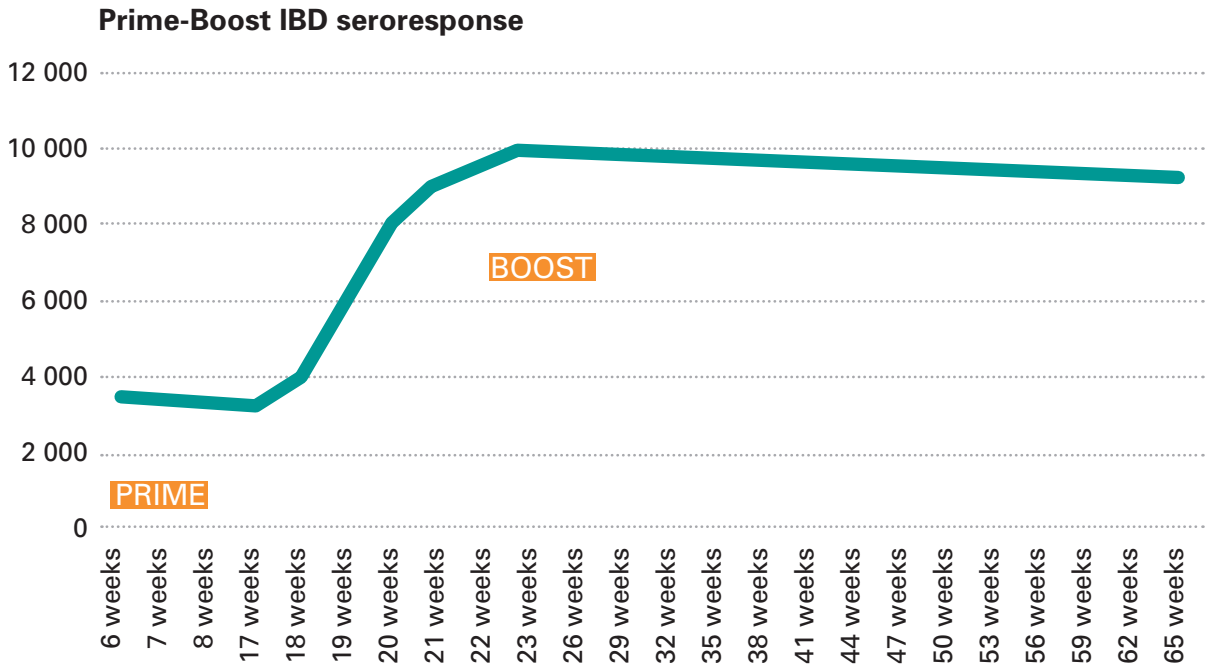


Figure 1. An example of the seroresponse to live and inactivated IBD vaccines in rearing.

This prime-boost approach allows not only for the long-term protection of the bird but also to produce long lasting and uniform MDA (maternally derived antibodies) to be passed onto the progeny (passive immunity).

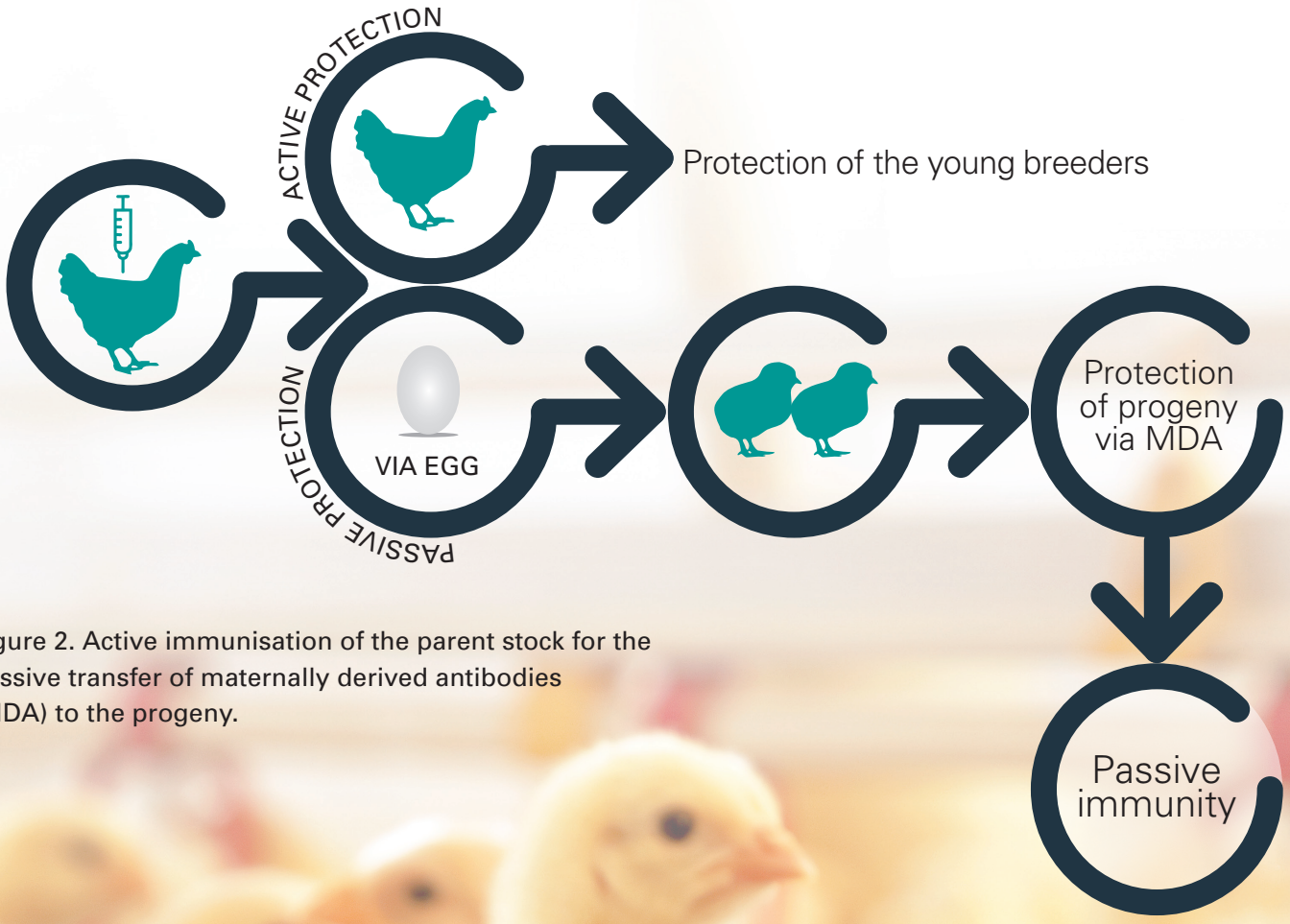


Figure 2. Active immunisation of the parent stock for the passive transfer of maternally derived antibodies (MDA) to the progeny.

What is the composition of inactivated vaccines?

Inactivated vaccines are based on emulsions. An emulsion is colloidal system based on 2 liquids which do not merge into a one phase liquid when mixing but stay separate in phases. The water phase is dispersed on a micrometer scale into the oil phase. Even and uniform dispersion make the emulsion homogeneous for an extended period.

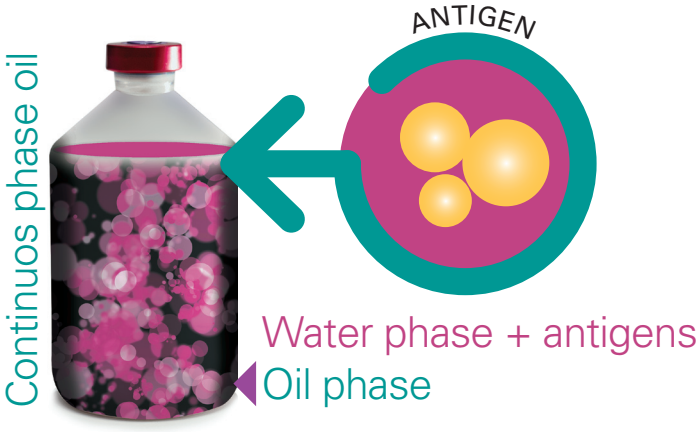


Figure 3. Basic composition of inactivated vaccines.

Inactivated vaccines are comprised of 2 main components:

- The antigen/multiple antigen(s) fraction in the water phase
- The adjuvant (the adjuvant in most cases is a mineral oil).

These 2 components are combined into an emulsion.

The antigen

The antigen consists of inactivated particles for example a virus or bacteria in the water phase of the emulsion.

The antigen may be:

- A complete inactivated infectious antigen for example a virus or bacteria
- Non-infectious particles (subunits)
- Purified viral or bacterial proteins.

The inactivated antigen does not replicate in the chicken and the immune response is stimulated by exposure to the administered antigen over an extended period. This exposure over time is facilitated by the adjuvant.

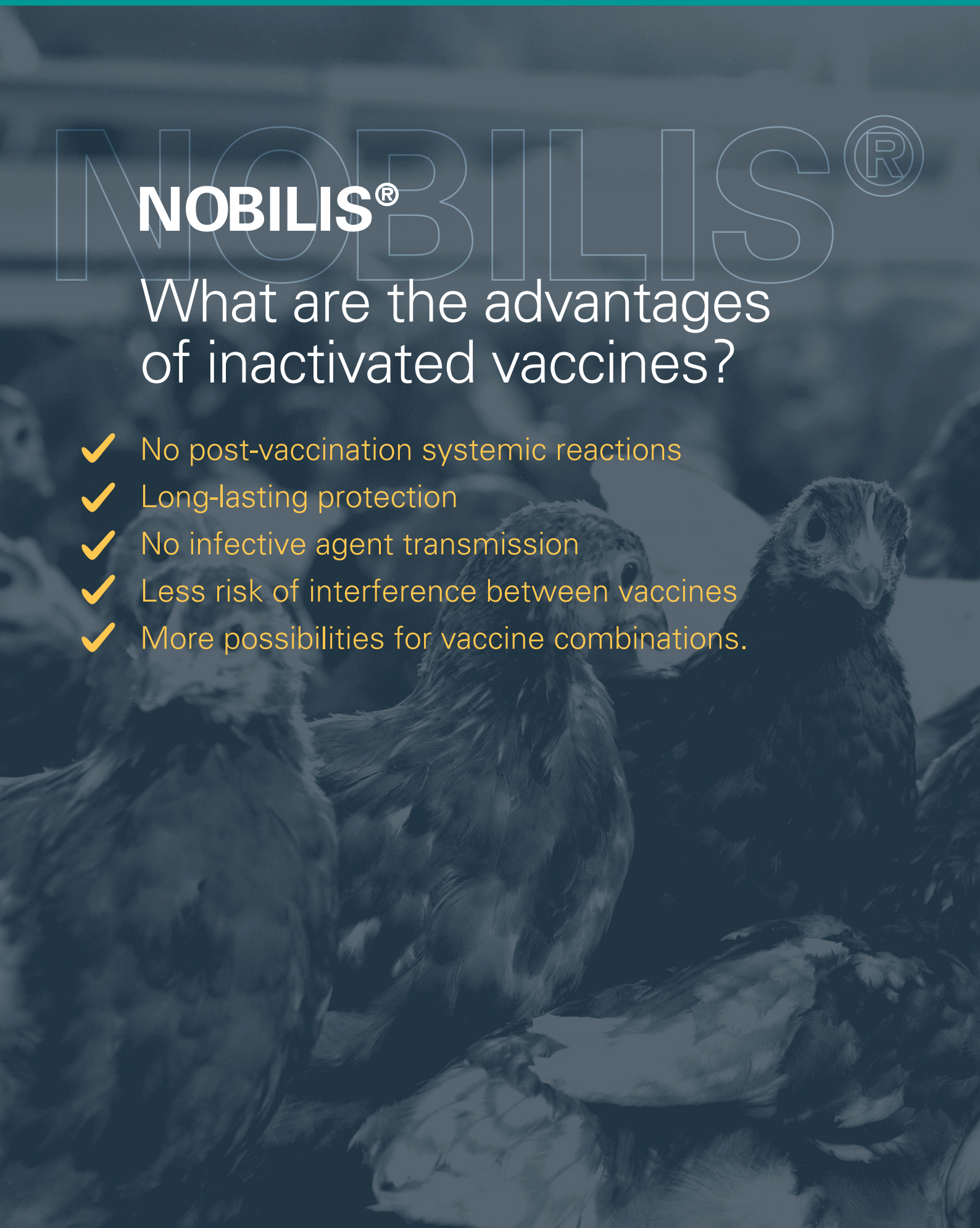
The adjuvant

The mineral oil adjuvant is the main part of the emulsion in which the water phase, carrying the antigen(s), is uniformly dispersed. The adjuvant allows for the slow release of the antigen and it attracts immune cells to the site where the inactivated vaccine has been deposited.

The functions of the adjuvant include:

- Improved immune response
- Facilitates the long-lasting effect of the inactivated vaccine
- Provides a stable environment for the antigen.

There are many different types of adjuvants and each type of adjuvant produces different immune responses and local reactions. Most of the adjuvants in the MSD Nobilis® Inactivated Poultry Vaccine Range consist of mineral oil, water in oil emulsion (oil adjuvants). These mineral oil vaccines induce more of a local reaction than some other adjuvants, however, this induces a long lasting protective immune response.



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What are the advantages of inactivated vaccines?

- No post-vaccination systemic reactions
- Long-lasting protection
- No infective agent transmission
- Less risk of interference between vaccines
- More possibilities for vaccine combinations.

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Inactivated Poultry Vaccines

What makes MSD Animal Health Nobilis® Inactivated Poultry vaccines different?

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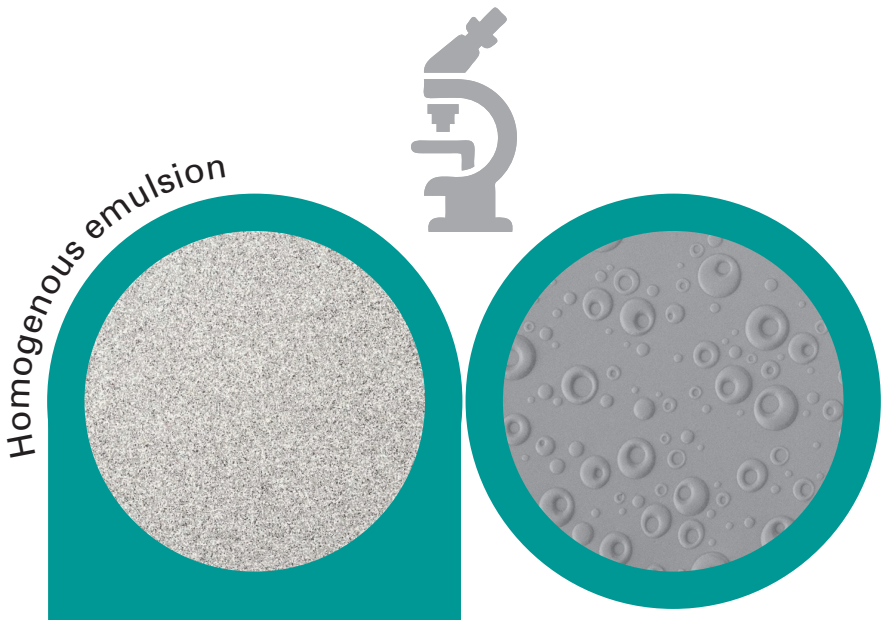
The milling process is important to the homogeneity of the emulsion. The process involved in the milling of the emulsion may either be a high shear or low shear. High shear milling results in homogenous emulsions with uniform distribution of antigen throughout the emulsion. Uniform distribution of the antigen in the vaccine allows for even dosing and a uniform response to the vaccine. The high shear process also results in stable emulsions with low viscosity for easy administration.

Another characteristic of high shear is that they demonstrate significant sedimentation. This sedimentation is a normal characteristic of an emulsion, especially after long storage and is the reason that inactivated vaccines should be mixed/shaken thoroughly before use.



High Shear

Advantages:
Stable emulsion even with bacterial suspension
Low viscosity

Disadvantages:
Strong sedimentation

Low Shear

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Which factors should be taken into consideration when selecting an inactivated vaccine?

From the information above it is clear that not all inactivated vaccines are equal. When selecting an inactivated vaccine for your vaccination programme the following factors should be taken into consideration:

- **Uniform distribution of the antigen in the adjuvant**
- **Ease of administration with regards to viscosity**
- **Long duration of immunity due to slow release of the antigen**
- **Proven efficacy**
- **Convenient antigen combinations to minimise bird handling**

MSD has invested years of research and development to produce high quality, premium inactivated vaccines in various combinations as part of the Nobilis® Inactivated Range to provide the producer with proven disease control solutions.

Contact your MSD Animal Health key account manager or local distributor for more information about Nobilis® Inactivated vaccines and combinations available in your country.

References:
1. MSD AH Inactivated vaccine portfolio training June 2020 - Rik Koopman
2. Nobilis Inactivated Vaccines. The fine art of poultry protection 2016.