Avian Influenza Vaccination and Monitoring

Learn about the efforts of the Ministry of Livestock, Agriculture and Fisheries (MGAP) to control and prevent the spread of avian influenza in Uruguay.

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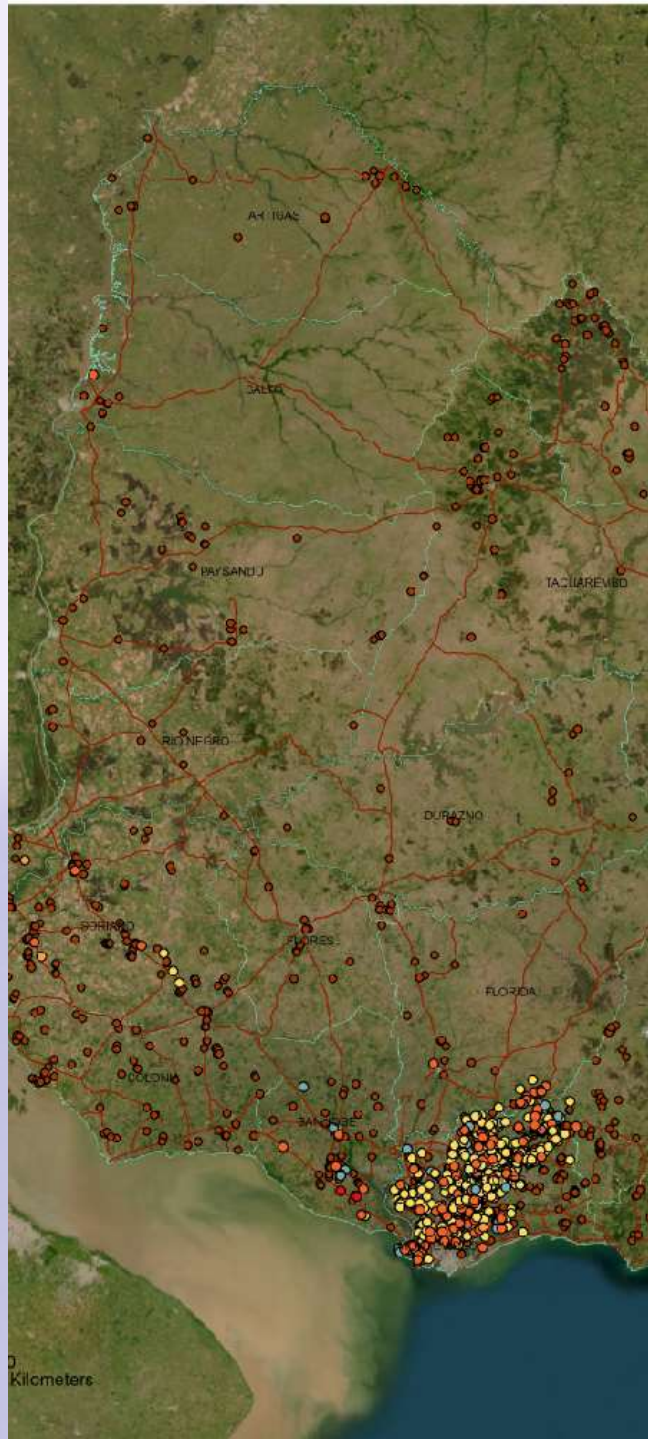
Epidemiological Reality of Uruguay

The Uruguayan poultry sector is characterized by a strong orientation towards the domestic market, with production concentrated within a 30 km radius around the capital. In this area, various types of establishments coexist, such as layer farms, breeder farms, and broiler farms, which present very heterogeneous biosecurity levels.

This epidemiological reality poses challenges in terms of control and prevention of poultry diseases, given the proximity and disparity of biosecurity practices among the different farms.



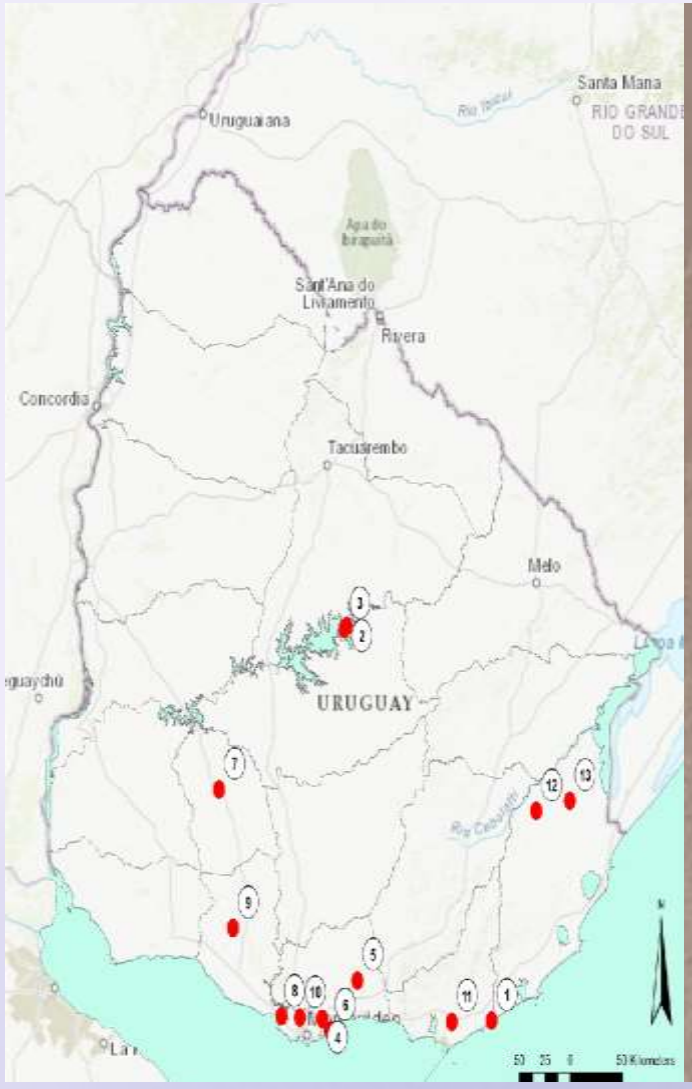
Outbreaks Occurring in Uruguay

Outbreaks in Wild and Backyard Poultry: Since February 15, 2023, there have been 14 outbreaks where the health authorities acted in less than 24 hours to eliminate carcasses and affected populations.

Economic Compensation for Producers: The government has financially compensated producers in each case of a detected outbreak.

Impact on Wildlife: Some outbreaks have occurred in a reserve, with an impact on birds and mammals such as “coatis”, being quickly controlled by the competent authorities.

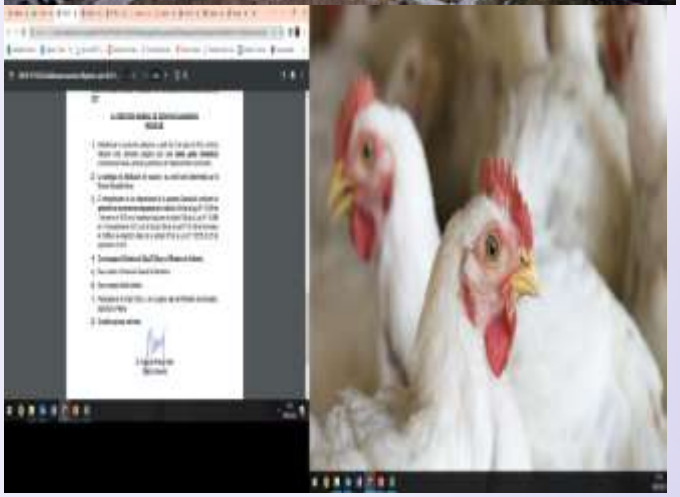
Cases in Sea Lions: Starting in November, cases have been detected in sea lions away from the poultry area, with a rapid control by the government.


Uruguaiana
Santa Maria
RIO GRANDE DO SUL
Sant'Ana do Livramento
Rivera
Concordia
Tacuarembo
Melo
URUGUAY
Lavalleja
50 25 0 50 Kilometers

IAAP Vaccination Resolution in Uruguay

Faced with the uncertainty generated by the cases of avian influenza that were occurring, the government of Uruguay decided to implement a vaccination plan. To determine the most appropriate vaccines for the country's reality, a public-private scientific committee was formed to evaluate the available options.

The evaluating scientific committee would analyze the characteristics of the different vaccines and make recommendations on which would be the most appropriate to be used in the vaccination program in Uruguay.



Evaluation of Vaccines by the Private/Public Scientific Committee

The Evaluating Scientific Committee conducted a thorough evaluation of 10 types of avian influenza vaccines from laboratories in Mexico, China, France, and the United States. The most effective and available vaccines were selected, considering the similarity to the circulating virus and scientific information on their efficacy that back up the information provided by the Pharmaceutical companies, they also have to allow DIVA (Differentiating Infected from Vaccinated Animals. Tests were also performed to determine the level of protection in the animals through the Hemagglutination Inhibition test. Decisions based on ground info and inputs of oficials and private veterinarians, academics, and laboratorios, become public policy.

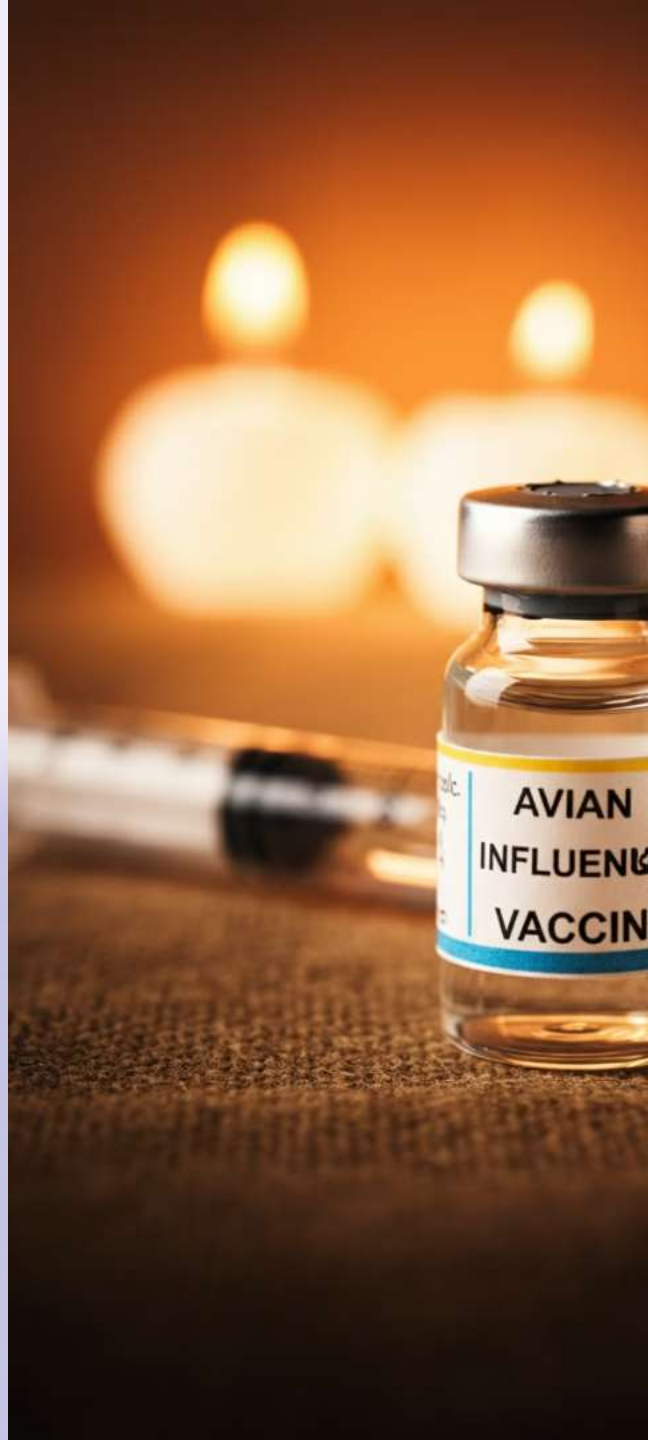
Inactivated H5N8 Vaccine

Inactivated H5N8 Clade 2.3.4.4 vaccine is administered from 4 weeks of age, with a dose of 0.5 ml per bird. The route of administration is subcutaneous in the middle and posterior part of the neck, although in the case of laying hens it can also be administered intramuscularly in the upper part of the chest.

A revaccination is required between 21 and 28 days after the first dose.

HVT Vector Vaccine

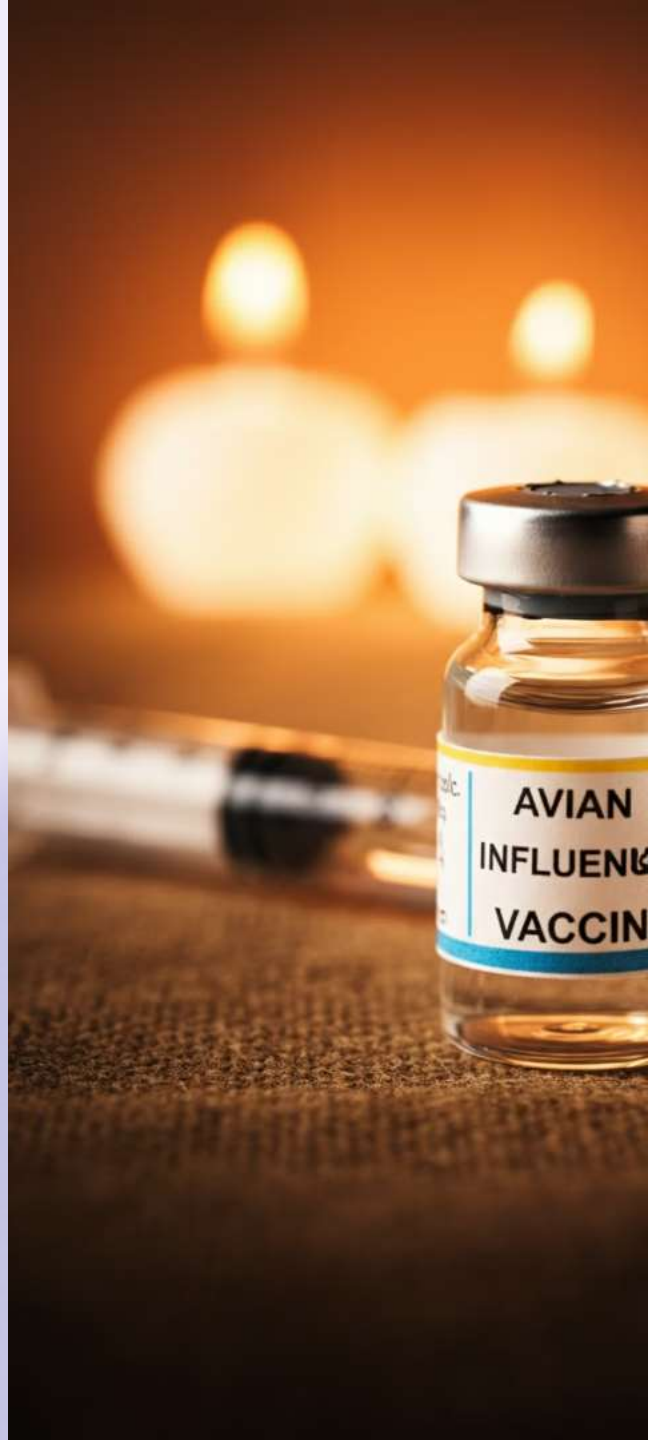
- Applied on the day of birth or at the time of importing BB breeders, both light and heavy, from Argentina or Brazil.
- Frozen vaccine 0,2 on diluyent, subcutaneous. Aditionally allows in ovo vaccination not performed in our country.
- Contains genetically modified Marek virus, serotype 3 that expresses key protection antigen H5 form HPAI.
- Induces a cellular response from 3 weeks, with a higher response at the 8th week.
- Allowes DIVA.



Avianpox Vector Vaccine

- Applied on the day of birth or at the time of importing BB breeders, both light and heavy, from Argentina or Brazil.
- Liofilaze vaccine, fits sanitary plans from imported breeders that wants to get Marek vaccines at original farm.

- Contains genetically modified poxvirus, inserted with HPAI H5.
- Allowes DIVA.



Vaccination Guidelines

Vaccination was agreed to be mandatory for light and heavy breeders, as well as for commercial layer establishments, both licensed and unlicensed, given the health emergency and under veterinary supervision. A vaccine bank was established to be imported by the MGAP, of 2.5 million inactivated doses, for possible focal control.

Vaccination began with the arrival of the vectorized vaccine starting on May 2, 2023, and the inactivated vaccine, starting on May 16, 2023. It was carried out under the supervision of accredited veterinarians, after training courses given by the DGSG and the Faculty of Veterinary Medicine in April.

For 2023 and 2024, a Post-Vaccination Monitoring Plan was developed, which will be applied to as many establishments as possible.

Vaccination Plan:

At the birth of laying hens in incubators

Vaccination begins with the newly hatched birds in the incubators, ensuring early protection.

or upon the import of Breeders

For imported breeder birds, vaccination is performed upon arrival, ensuring their immunity from the start.

Rearing and growing

During the rearing and growing stages, the birds receive additional doses of the vaccine to maintain their immunity.

Production

The birds in production also receive booster doses to ensure continuous protection against avian influenza.

Vaccine Distribution

From May 2, 2023 to October 1, a total of 11,000,000 doses of inactivated vaccines and 3,600,000 doses of vectorized vaccines have been distributed.

This information has been uploaded to the SISA animal health platform by accredited private veterinarians.

The accredited Freelance Veterinarian brings a completed form for each establishment, including biosecurity and company authorization.

In August 2023 Vaccination Plan maintains the application of the vectorized vaccine to all newborn and imported animals, and adds a revaccination with the inactivated vaccine between 8 and 12 weeks of age during the rearing period. Additionally, a reserve of 2.5 million doses of inactivated vaccines is maintained by MGAP

Why Vaccinate?

Increase Resistance

Vaccination increases the resistance of birds to infection by the Avian Influenza virus.

Reduce Replication

It decreases viral replication in the respiratory and gastrointestinal tract, thereby reducing virus shedding.

Prevent Disease

It prevents disease and death in poultry, protecting them against the effects of Avian Influenza.

Complement Biosecurity

Vaccination adds an additional tool of protection, but does not replace biosecurity measures.

Considerations for Continuing Vaccination

1 Epidemiological Situation

Monitor the evolution of avian influenza in the country and the region to determine the need to continue vaccination.

2 Export of Poultry Products

Maintaining vaccination may facilitate the decision to expand the export of Uruguayan poultry products.

3 Government Support

The contribution of the Ministry in vaccination and monitoring is key to sustaining the program in the long term.

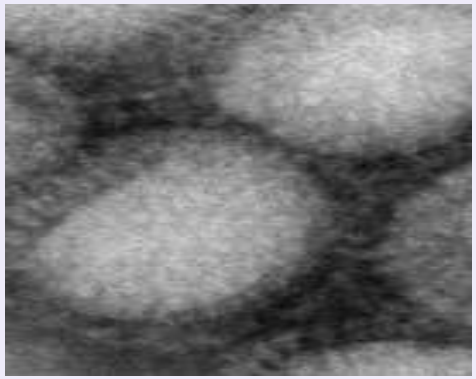
4 Antigenic Variants

Be alert to the appearance of new variants of the virus that could affect the effectiveness of the current vaccine.

Vaccine Coverage

All breeder and hatchery farms were immunized, along with a large majority of laying farms, data supported on antibody presence (HI) on active surveillance.

An Additional 70 establishments that were not yet authorized were admitted for vaccination, resulting in a 15% increase in the laying population integrated into goverment control plans, thanks to the coordinated work with suppliers, colleagues and unions.



Objective of Post-Vaccination Monitoring

Detect silent viral circulation in the vaccinated population.

Use the information from the surveillance system to defend the country's health status at the WOAH.

Verify that vaccination does not affect the status of the country

or zone free of highly pathogenic avian influenza.

Determine the level of protection in the vaccinated bird population.

Active Surveillance

To monitor the circulation of the avian influenza virus, active surveillance is carried out on farms. 60 samples are collected from live birds in pools of 10 animals, and up to 10 samples from dead birds of the day. In addition, 11 serum samples are taken per shed to determine the level of protection. No sample has tested positive for avian influenza or Newcastle disease by real-time PCR.

This comprehensive surveillance program allows testing 8,100 animals per year and early detection of any viral circulation on the farms. Up to date, 135 farms have been test for HPAI and NC.

Evaluation of farm titles

Determination of the viral replication level of the HVT vector of the vectorized vaccine through spleen imprint analysis, in collaboration with CEVA, at the stage of sending samples to be performed at Laboratory Phylaxia Zrt. Hungary.

Level of protection by HI (hemagglutination inhibition) contribution from the Ministry of Mexico SAGARPA, through collaboration with AVIMEX sending the antigen.

Example of public/private/international collaboration to evaluate the efficacy of vaccine on farms in Uruguay were succesfull.

Post-Vaccination Monitoring Results

No Viral Circulation Detected

No presence of the highly pathogenic avian influenza virus or the Newcastle virus was detected in the swabs taken.

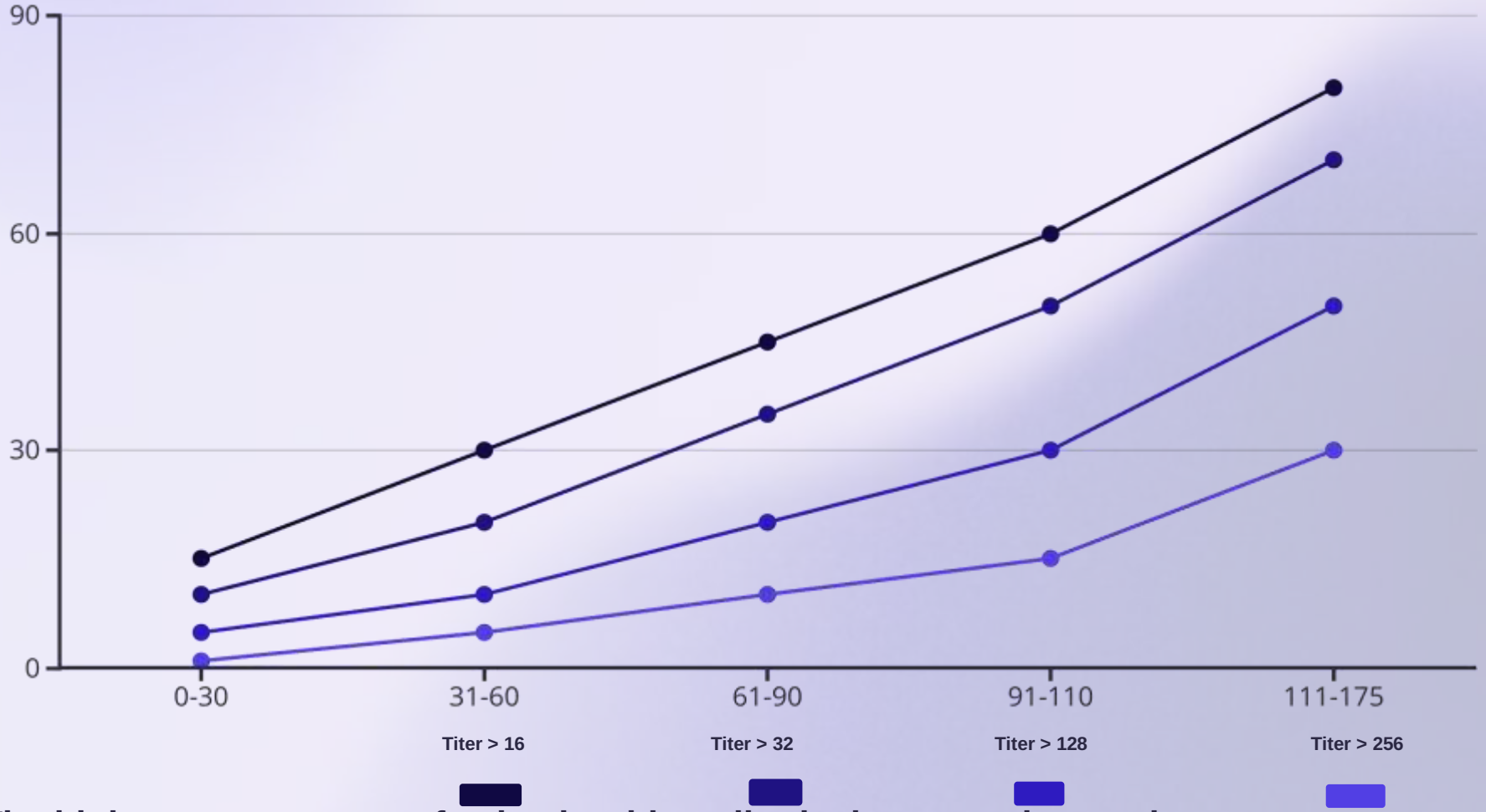
Adequate Immunity

Appropriate levels of protection were observed in most farms with vaccinated animals, through hemagglutination inhibition tests.

Some Minor Results

In some farms, lower immunity levels were found, possibly related to issues in the vaccine application or with birds at the end of their production cycle.

Percentages of evaluated birds that reach antibody titer levels >1 6, >32, >1 28 and >256 for the most commonly used vaccination protocol in different sampling periods (days post-vaccination)



The highest percentages of animals with antibody titers are observed between 110 and 175 days post-vaccination.

Percentages of evaluated hens according to vaccination protocol

45%

Titers >1 6

Percentage of hens with titers greater than 16 across all vaccination protocols

32%

Titers >32

Percentage of hens with titers greater than 32 across all vaccination protocols

1 2%

Titers >1 28

Percentage of hens with titers greater than 128 across all vaccination protocols

5%

Titers >256

Percentage of hens with titers greater than 256 across all vaccination protocols

The results show a decrease in the percentage of reactive animals as the titer threshold increases. The combined Vectorized and inactivated protocol generated the highest number of hens with elevated titers. Significant differences were only observed between the Vectorized (HVT)/Inactivated and Vectorized (HVT)/No vaccine protocols.

Evaluation of the Proposed Health Plan

A follow-up was carried out on 30 animals in a laying farm, in one of heavy breeders, and in progress in another of light breeders and in the re-feathering. They were bled every 14 days from the second dose (8th week with inactivated) until the 16th, which go to laying. Adequate levels of protection were obtained throughout that period (greater than 1/32).

Vaccination Schedule and Results

1

Week 0: Vectorized Vaccine

Vaccination with a vectorized (avianpox) vaccine is administered to the birds at week 0 of age.

2

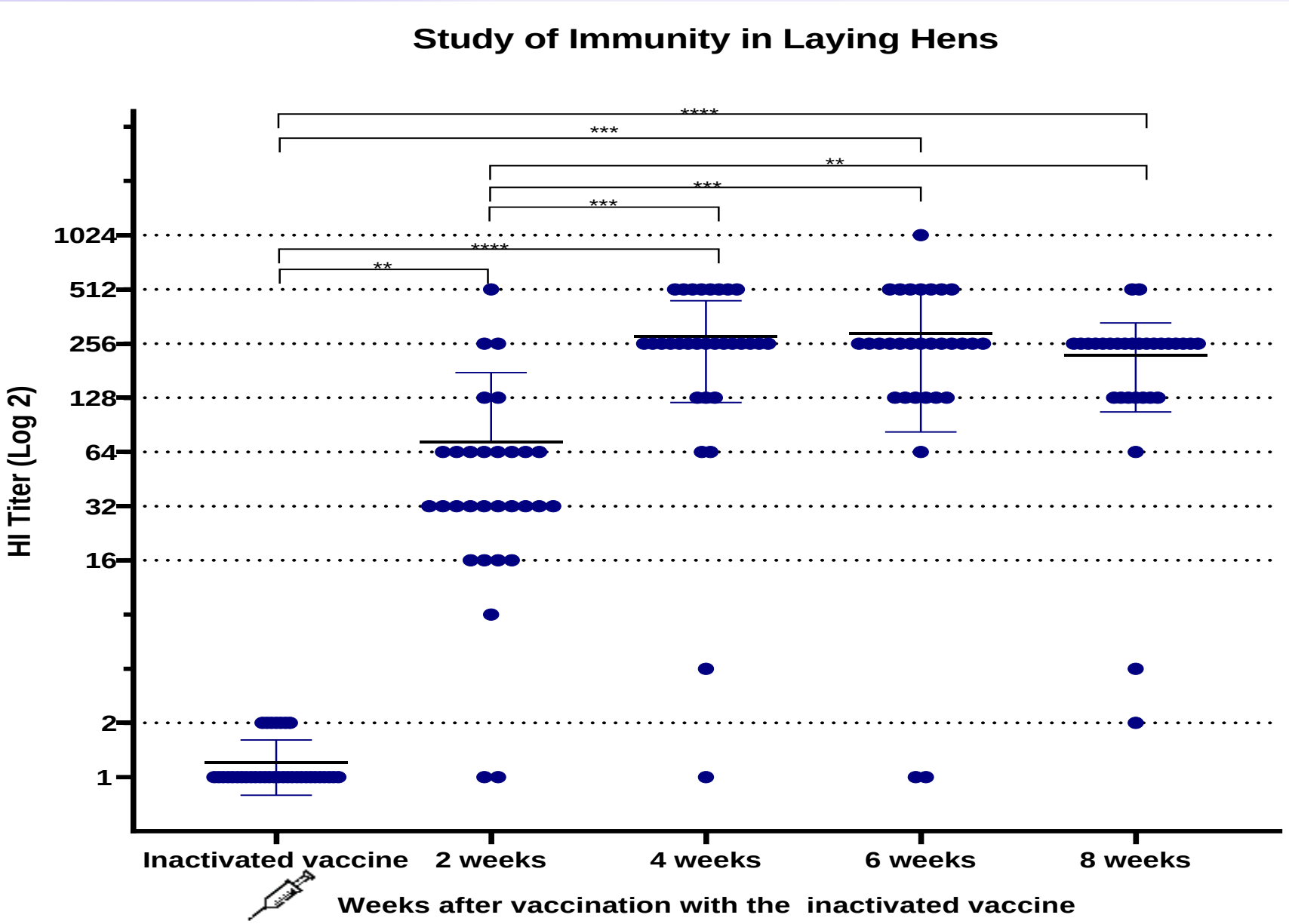
Week 8: Inactivated Vaccine

An inactivated vaccine is then administered to the birds at week 8 of age.

3

Titer Evaluation

Titer levels are evaluated at baseline before week 8, and then at weeks 10, 12, 14, and 16 to monitor the immune response.



One-way ANOVA. Kruskal-Wallis test. **p <0,01; ***p<0,001; ****p<0,0001

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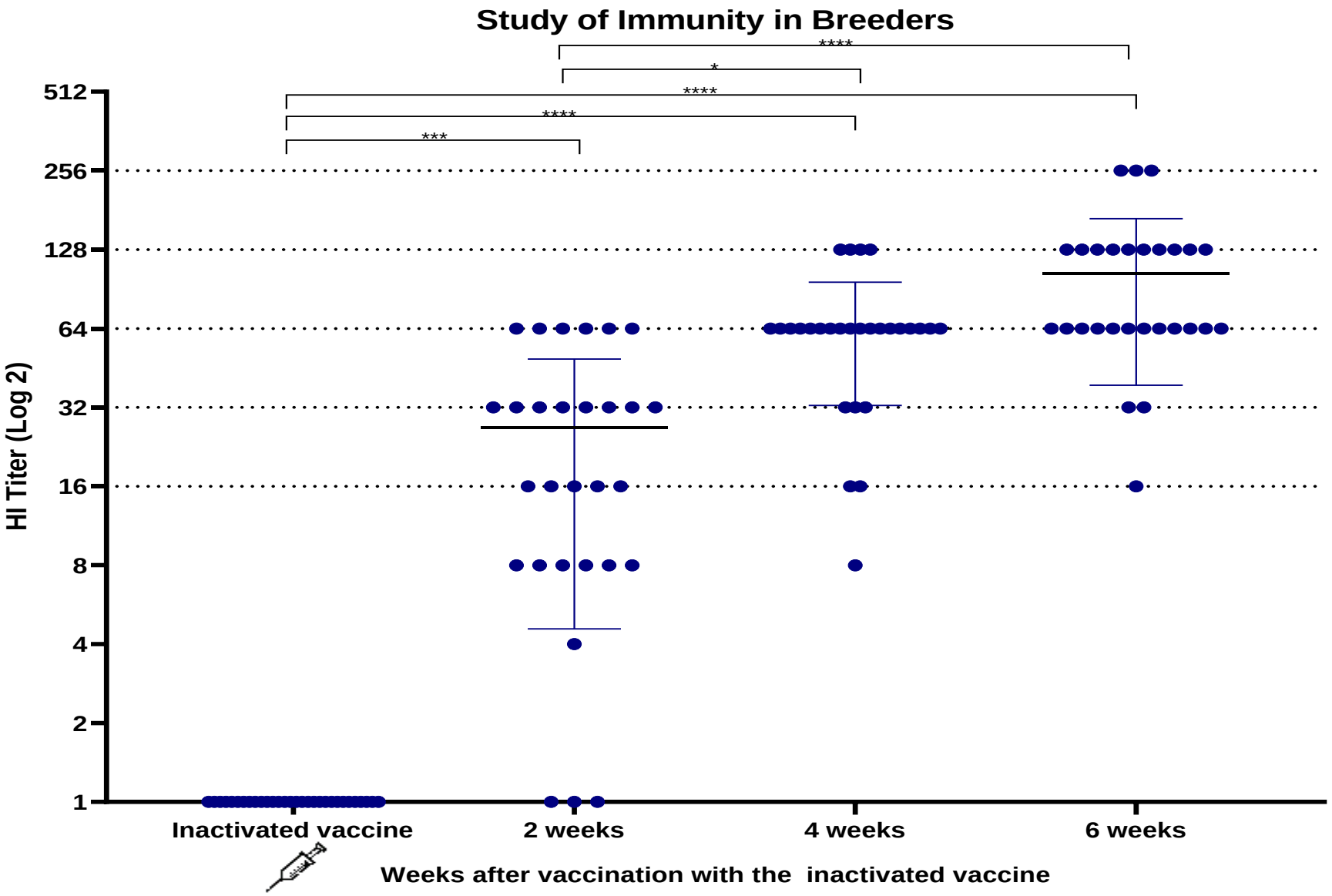

One-way ANOVA. Kruskal-Wallis test.*p=0,0111; ***p=0,0004; ****p<0,0001

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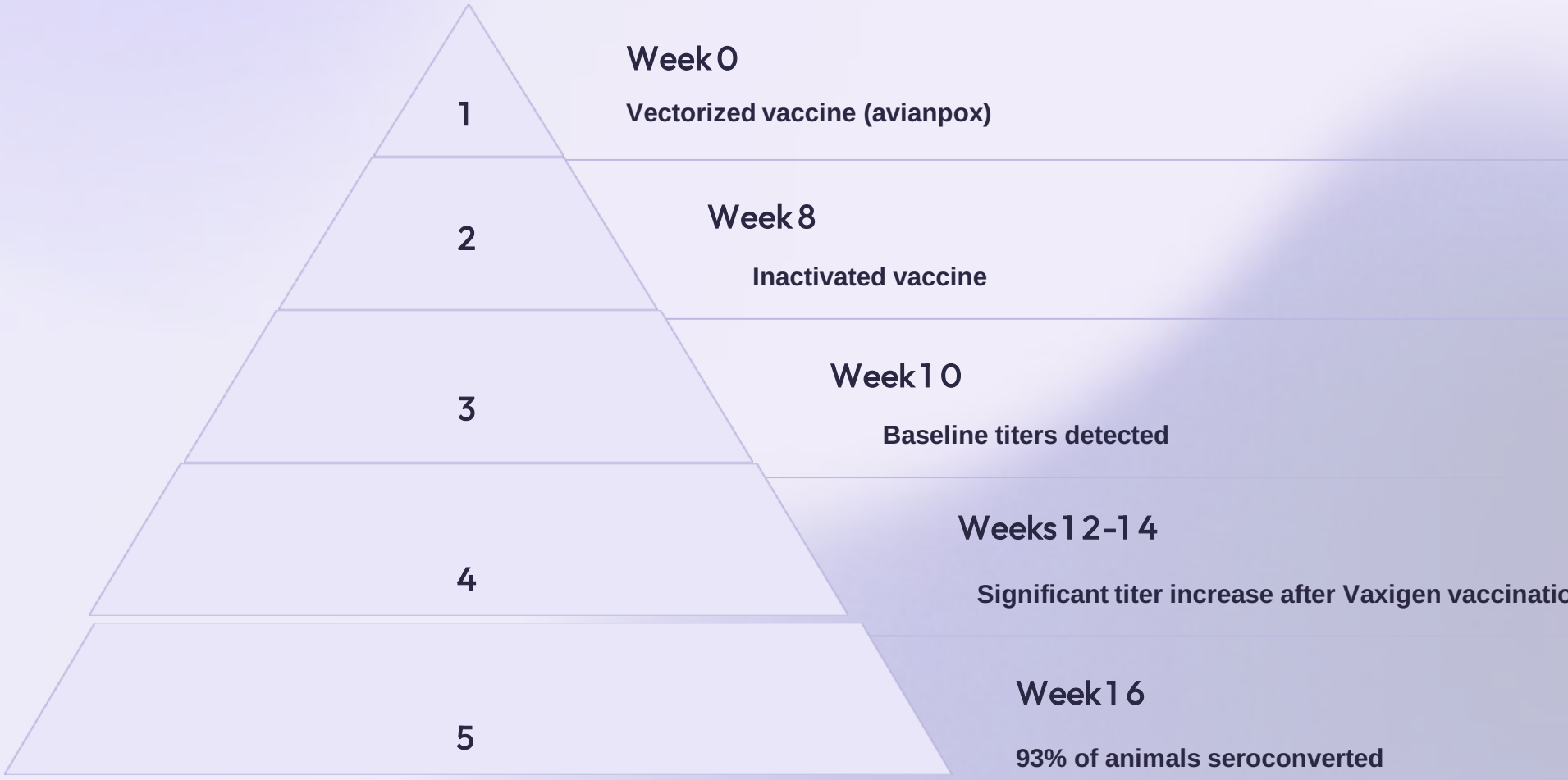
Vaccination Schedule and Results



The vaccination schedule included a vectorized vaccine at week 0 and an inactivated vaccine at week 8. Baseline titers were detected at week 10, with a significant increase in titers observed 2, 4, and 6 weeks after the inativated vaccination.

By week 16, 93% of animals had seroconverted.

Percentages of breeding and laying birds evaluated

80%

Titer > 1 /32

Protection criteria according to the OIE

60%

Titer > 1 /1 28

High antibody level

40%

Titer > 1 /256

Very high antibody level

No significant differences were observed between the percentages of laying and breeding birds that reached the different levels of antibody titers.

Some open thaughts:

Uruguay was the only country with no HPAI on commercial farms, but from our particular situation, adequate protection program against the virus using vaccines on comercial flocks.

It was demostrated also, with a correct surveillance program, that more than 50% of the farms have protective titers (1/32) based on WHOA reccomendations.

The success of this policy includes the use of an effective vacination plan that provided peace of mind, the protection of a primary food supply industry and food security for our population.

More positive factors were the incorporation of 15% more farms outside the official radar, and especially, the joint work of private and government agencies, including inter-ministerial agencies, under the concept of ONE HEALTH.

Inmune response vas evaluate on our vaccination program and more essays are held at the moment (laying breeders, and re feathering adults).

Improving biosecurity programs also are developed at this moment.

Thank you very much!

Aknowledgments: Our families first.

MGAP Officers: Dr. Diego de Freitas, Dr. Martin Altuna, Dra. Valeria Gayo, Dr. Marcelo Cortez, Dra. Maria Laura Bertalmio, Dra. Laura Baygorria, Dra. Virginia Russi, Dra. Leticia Luengo, Dr. Sebastián Chiozza, Dra. Verónca Grolero, Dr. Nicolas Simento, Dr. Raul Negro, Dra. Berta Chelle, Dr. Daniel Di Rienzo, Dra. J ohanna Segovia.

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