LESS IS MORE

SIMPLIFY LAYER VACCINATION PROGRAM WITH CEVA NEW TECHNOLOGY VACCINES

Help you to reach your safety and efficacy goals
with less vaccine applications

Eggs with poultry meat are set to become the world's most widely consumed animal protein. In recent years' egg products have been rapidly gaining ground as their consumption in domestic and commercial settings has increased dramatically. In addition to that, world egg production has grown by 25% in the last 10 years. This success brings with in new challenges such as cost of poultry production, disease challenge, antibiotic reduction and food safety.

Anticipating and understanding how we can help producers overcome these challenges, is exactly how we will drive the innovation necessary to protect the reputation of birds as a healthy food for consumption.

LESS IS **MORE**

This document aims to present Ceva's vaccines offer in Commercial Layer, **"Less is More"** describes that we wish to make available to all Egg producers around the world to ensure their success starting in the hatchery.

Ceva provides the innovative vaccines, equipment, services, experts and staff along with other innovative solutions for improving our customer's performance thanks to a better control of layers diseases.

With less vaccine applications, less handling, less stress and less antibiotic usage, your birds will be protected and uniform and your productivity will increase when applying our approach that is summarized in this brochure about "Less is More".

This is our commitment to your business success that allows simplify layer vaccination program with Ceva new technology vaccines.

SIMPLIFY LAYER VACCINATION PROGRAM WITH CEVA NEW TECHNOLOGY VACCINES

Help you to reach your safety and efficacy goals with less vaccine applications

THE LARGEST DISEASE COVERAGE WITH INNOVATIVE VACCINES FROM THE HATCHERY

INNOVATIVE HATCHERY VACCINES

NOVAMUNE® | Vectormune® ND | Cevac IBird® + Cevac® Mass L | cevac MD Rispens | IMMUcox® 5

Immunize your chicks from the hatchery and reduce field booster application for IBD, ND, IB*

** According to market specificity you can use as well Ceva AI or ILT vaccines solutions at the hatchery.*

INNOVATIVE FIELD VACCINES

vectormune FP LT | vectormune FP ILT + AE | cevac CORYMUNE 4 K | cevac CORYMUNE 7 K | cevac MEGAMUNE K

Perfect balance between safety and efficacy in a single injection, reduce catching stress and handling of birds.

UP TO

50%

LESS VACCINE APLICATION WITH BETTER SAFETY AND EFFIACY

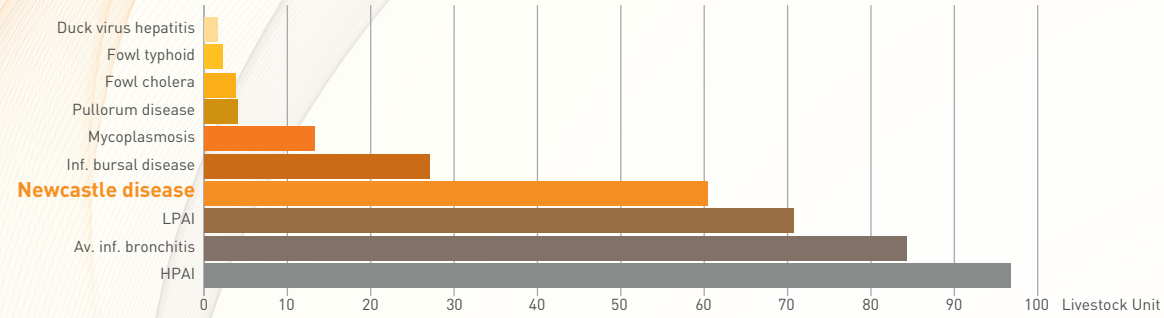
Less Handling
Less Stress
Less Antibiotic usage

MORE Uniformity
MORE Protection
MORE Profitability

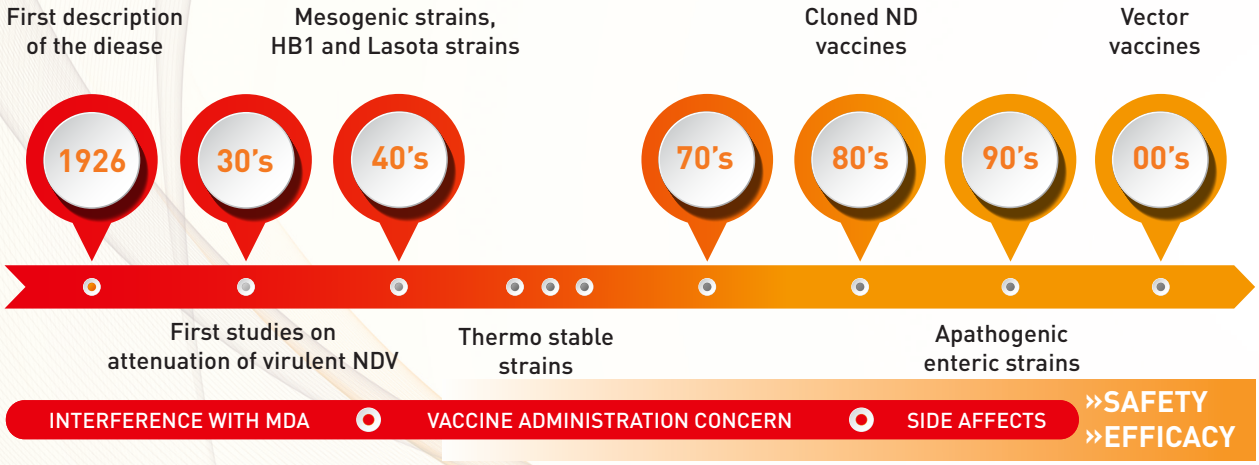
Vectormune® ND

ND is still a threat to the poultry industry

Newcastle disease (ND) is one of the most economically and clinically important poultry diseases.[1]

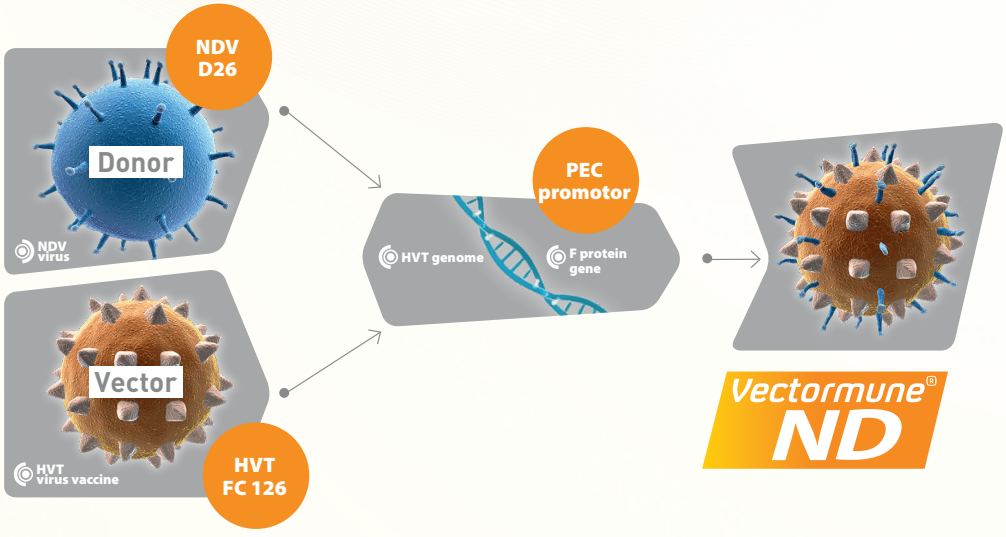


Recent innovations bring vector vaccine technology against ND with higher protection and no post vaccination reaction



Vectormune® ND

Vectormune® ND is a reference vector HVT vaccine, in which genome the "F" gene of a genotype I NDV has been inserted. The HVT strain used (FC 126), its origin, the low number of passages applied, the "F" insert, the insertion site, the promoter selected to ensure the expression of the F gene, the terminal sequence are all key elements explaining the uniqueness and outstanding features of this vaccine. Most of these features have been patented and belong to Ceva Animal Health. Vectormune® ND is actually unique and cannot be confused with other rHVT-ND vaccines.



INSTALL THE ULTIMATE **ANTIVIRUS**

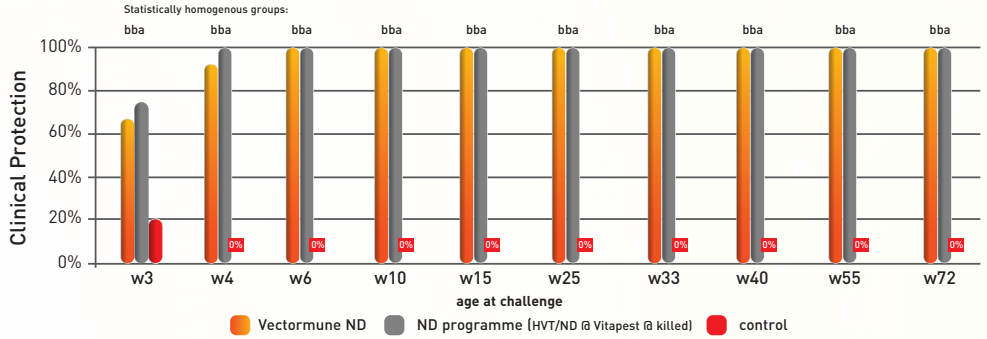
Vectormune® ND is inducing long lasting protection[2]

Vectormune® ND is a HVT vaccine, it replicates on continuously, boosting the birds'immunity for its entire life. Protection up to 72 weeks of age, after a single Vectormune® ND vaccination at day 1 has been demonstrated Commercial pullets have been vaccinated at day 1 with Vectormune® ND and challenged by mucosal route with recent genotype VII isolate from 3 to 72 weeks of age.

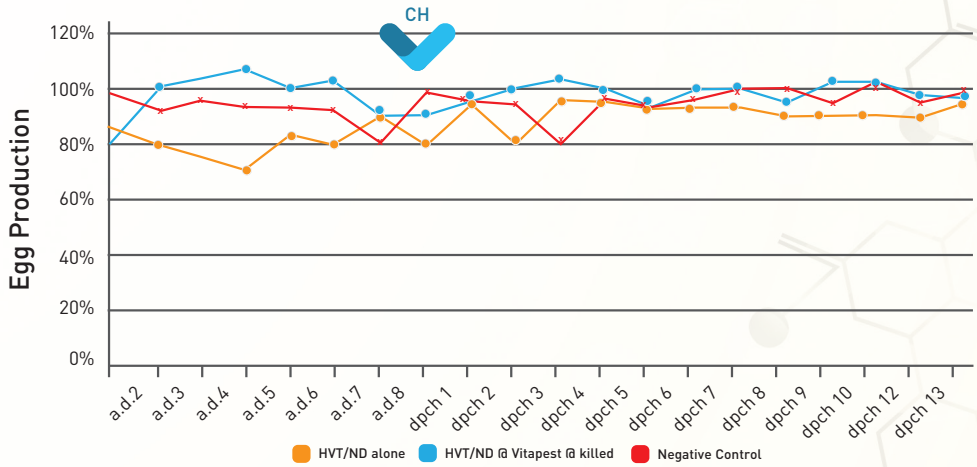
Vectormune® ND alone induced a strong immunity (clinical signs + shedding controls) up to 72 weeks of age.

At 3 weeks of age already good (75%), from 4 to 72 weeks of age excellent clinical protection in the Vectormune® ND group (95-100%).

Clinical protection against challenge with vvNDV MY strain



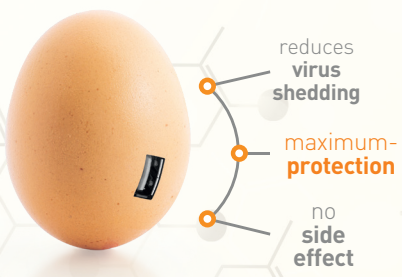
Vectormune® ND protects the egg production. Below graph shows that Vectormune® ND avoids the egg drop after the challenge with very virulent ND genotype VII Malaysian Strain at 33 weeks of age.
Vectormune® ND protects the egg production.



Clinical protection 100% 100% NA (unvaccinated challenged controls:0%)

Recommended Vaccination Program

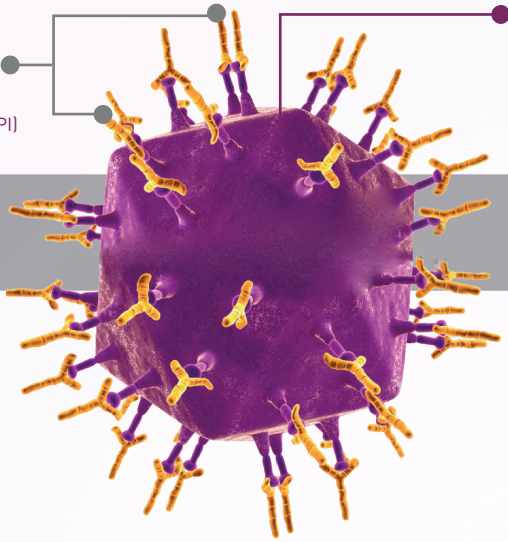
AGE	ROUTE	LOW NDV RISK COUNTRY	MEDIUM ND V RISK COUNTRY	HIGH NDV RISK COUNTRY
Day 1	SC	Vectormune ND	Vectormune ND	Vectormune ND
	Coarse spray		VITABRON L	VITABRON L
Week 2	Coarse spray			NEW L
Before Transfer	SC or IM	Inactivated ND	Inactivated ND	Inactivated ND



1: World Bank 2: Palya et al. Onset and long-term duration of immunity provided by a single vaccination with a turkey herpesvirus vector ND vaccine in commercial layers. Veterinary Immunology and Immunopathology 158, 105–115, 2014

NOVAMUNE®

THE VACCINE

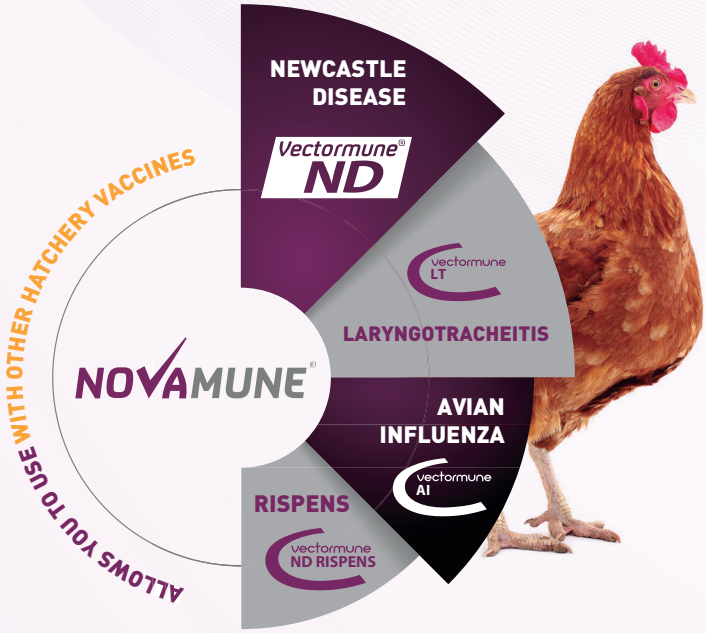


NOVAMUNE® is an IBD **immune complex** vaccine consisting of the **SYZA 26 strain** linked to specific antibodies called Virus Protecting Immunoglobulins, to be administrated **at day 1 in the hatchery.**

SIMPLIFY VACCINE PROGRAM

2 TO 4 APPLICATION

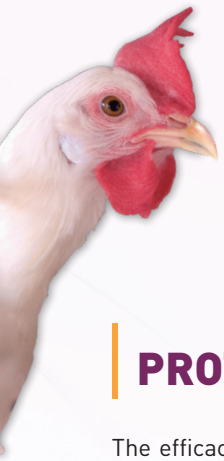
1 APPLICATION THE IN HATCHERY



IBD CONTROL

from the hatchery allows
you to re-think your vaccination program

- Can induce **strong protection;**
- Uniformity of application, as it is applied in the **hatchery – Day one;**
- **Higher flexibility** to combine vaccines.



IBD CONTROL FROM THE HATCHERY ALLOWS YOU TO RE-THINK YOUR VACCINATION PROGRAM

LESS IS MORE

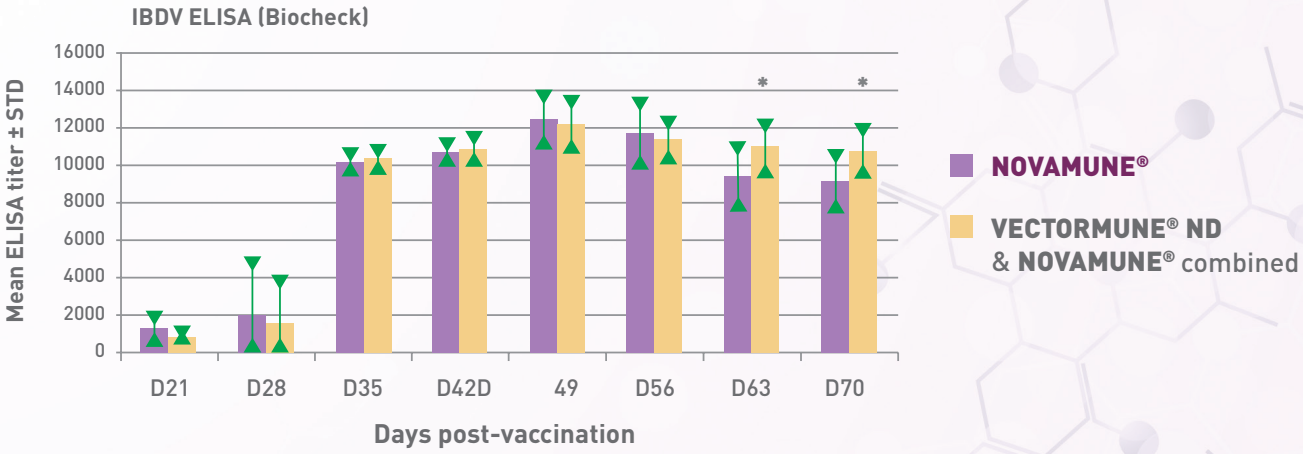
PROTECTION & REDUCTION OF SHEEDDING

The efficacy of **NOVAMUNE®** has been evaluated by challenge with very virulent IBDV strain in vaccinated chickens, and monitored the challenge virus spread to contact control chickens among the directly infected chickens.

	GROUP	RT-qPCR DETECTION OF CHALLENGE VIRUS STRAIN ISOLATED	CHALLENGE VIRUS EFFECT BASED ON BURSA HISTOPATHOLOGY	MORTALITY	MORBIDITY (CLINICAL SYMPTOM)	PROTECTION
1	Infected controls	wIBDV (100%)	100%	25%	45%	0%
2	NOVAMUNE	**Syza 26 (100%)**	**0%**	**0%**	**0%**	**100%**
3	Contact controls co-housed with Novamune group	Syza 26 (100%)	0%	0%	0%	100%

CONVENIENCE & FLEXIBILITY

NOVAMUNE® & **VECTORMUNE® ND** compatibility was evaluated in commercial layer pullets, when applied in a single shot at day-old subcutaneously, based on monitoring humoral immune response after combined application, in comparison with single application of each of the vaccines.



PROTECTS against infection from any type of IBDV strains

PREVENTION reduce the shedding and the risk of challenge

NO INTERFERENCE BETWEEN IBD & ND

NOVAMUNE® & VECTORMUNE® ND CAN BE MIXED, AND APPLIED IN ONE SINGLE SHOT.

ceva

CEVA RISPENS RANGE

cevac MD Rispens

vectormune ND RISPENS

Marek's Disease

Marek's Disease (MD) is a common and widespread disease in poultry caused by a Herpes virus. Marek's Disease was first described in 1907 by Jozsef Marek as Polyneuritis or Nerve inflammation[1]. Over the years the disease became more virulent leading to higher mortality, transient paralysis and to lymphoid tumors in the visceral organs.

Economical Impact Of Marek's Disease

Marek's vaccines have been proven to reduce mortality that can reach 60% in a non protected layer flocks. Non protected broiler flocks may experience losses from 0,1% to 0,5% and condemnations of 0,2% or more.[1] Before the introduction of widespread vaccination in commercial flocks, Marek's Disease was widespread in chickens. Recently the global economic losses caused by Marek's Disease were estimated between 1 to 2 billion dollars.[2]

Controlling Marek's Disease

In order to fully control Marek's Disease, there are 3 essential Critical Control Points.

1. Vaccination of birds with an immunogenic vaccine.
2. Correct storage, preparation and application of Marek's Disease vaccine. Great care should be taken to ensure the storage conditions, preparation and application of the vaccine is carried out as advised in order to obtain optimal protection.
3. Reducing the risk of early infection on the farm by implementing proper cleaning, desinfection and biosecurity measures.

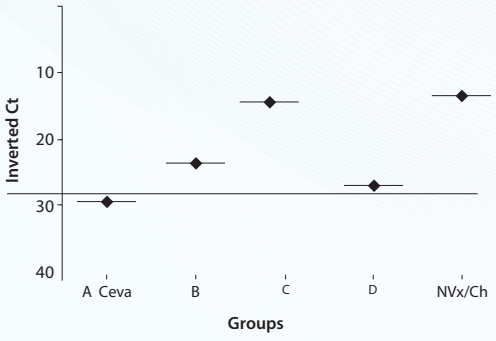
Cevac® MD Rispens Immuno–Potent Marek's Vaccine

In order to achieve protection against very virulent and very virulent + Marek's viruses present in the field, it is necessary to vaccinate birds with an immunogenic, low passage Rispens + HVT vaccine. The strain used in the Ceva Rispens based Marek's vaccines is derived from the original CVI 988 strain isolated from chickens in 1972 in the Netherlands[3].

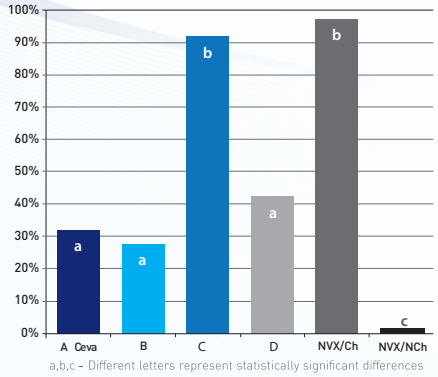
Protection Of Different Commercial Vaccines Against A Very Virulent + Marek's Disease Strain[4]

- One (1) day old Hy-Line (W36) commercial chicks were divided in 6 groups.
- Groups A, B, C & D were vaccinated by S.Q. route at hatch, using Cevac MD Rispens (Group A) or competitor Rispens products (Groups B, C and D). Group NVX/NCh was kept as non- vaccinated non-challenged negative controls. Group NVX/Ch was kept as non-vaccinated challenged birds.
- Day-of-age vaccinated Groups A, B, C & D and Group NVX/Ch were placed on litter along with three (3) week old shedder birds that were challenged using a vv+ MDV strain via the intraperitoneal route two weeks prior.

MDV-1 LOAD IN ENVIRONMENTAL DUST



%MORTALITY



a,b,c - Different letters represent statistically significant differences

CONCLUSION

- Rispens CVI988 vaccines showed different levels of protection in the presence of a very virulent plus (vv+) Marek's Disease Virus strain (T King Strain), with one of the reference rispens vaccines completely failing to protect.
- Cumulative total mortality was lower in chickens vaccinated with Cevac MD Rispens and two of the other three commercial vaccines, when compared to the NVX/Ch group.
- The detection of MDV-1 in environmental dust was lowest in the rooms were chickens were vaccinated with Cevac MD Rispens.

HER FUTURE LOOKS BRIGHT

STRONG PROTECTION IN BROAD COMBINATIONS

LESS IS MORE

Cevac® MD Rispens compatibility with Vectormune® ND and Novamune[5]

Cevac® MD rispens is available alone or in combination with Vectormune® ND

Vector HVT vaccine , Vectormune® ND is being widely used for the prevention and control of Newcastle disease (ND) and ND vaccine virus circulation.

Vectormune® ND induce significant level of immunity against Marek's disease (MD), combination with another MD vaccine is required to achieve proper control of MD in layers and breeders.

The aim of our study was to test the compatibility of the new ICX-IBD vaccine, Novamune with Cevac® MD Rispens and Vectormune® ND in commercial layers.

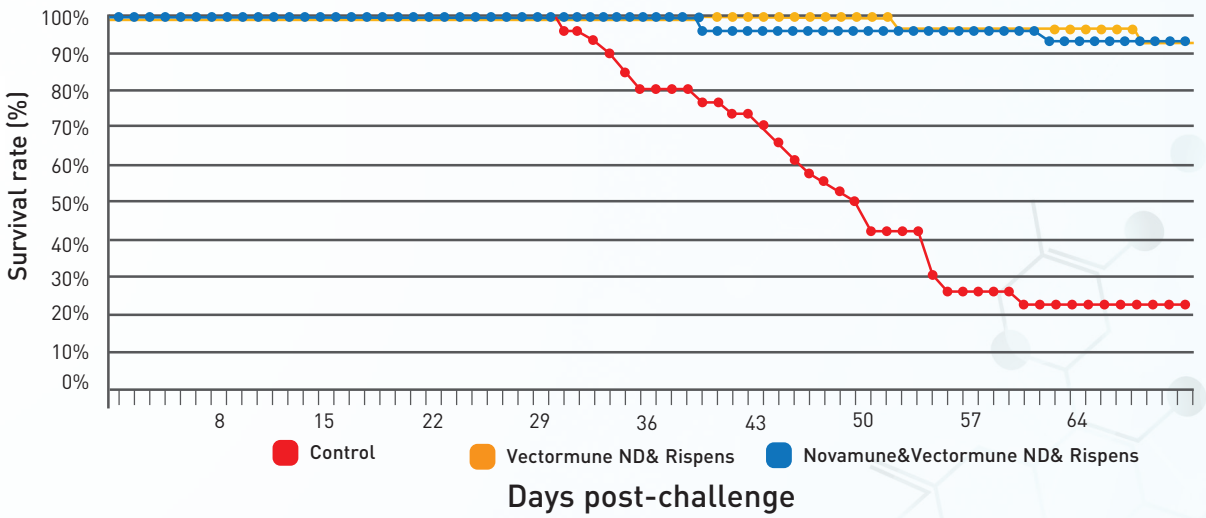
Vaccination was performed at day-old subcutaneously in one shot.

Efficacy of Cevac MD Rispens was evaluated based on the prevention of mortality and gross lesions, following challenge with MDV RB1B strain at 9 days of age. Challenge virus shedding was measured at 21 days' post-challenge.

Efficacy of Novamune was monitored by the detection of vaccine virus replication in the bursa Fabricii (histology and RT-PCR) and the increase of humoral antibody level to vaccination (ELISA). (please see Novamune page)

Efficacy of Vectormune® ND was monitored by ELISA serology. No negative effect of combination with Novamune and Cevac® MD Rispens on the immune response to Vectormune® ND

Clinical Protection Against Marek's Disease



CONCLUSION

Our results indicate that Cevac® MD Rispens for layers is compatible with Novamune and Vectormune® ND.

No Negative Effect on the efficacy of Vectormune® ND, Cevac® MD Rispens and Novamune vaccine combination against very virulent MDV (RB1B strain) challenge.

Benefits Of Ceva Rispens Range

1. Ceva Rispens strain provides strong protection against very virulent Marek's disease.
2. Broad range of products
   - **Cevac MD Rispens to be combined with Vectormune® HVT vaccines**
   - **Cevac MD HVT & Rispens**
   - **Vectormune® ND+Rispens**
   - **Vectormune® IBD+Rispens**
3. C.H.I.C.K Program Hatchery Service and Linilog: to ensure proper preparation, handling and application of the vaccine, through continuous improvement of the vaccination process.
4. Compatible with Vectormune HVT Range and Novamune.

REFERENCES : **1**: Marek, J. 1907 Multiple Nervenentzuedung (Polyneuritis) bei Huehnern. Dtsch Tierartzl Wochenschr 15 (471-421)- **2**: Disease of Poultry , 13th Edition- Marek's Disease. Page 515 -552. Schat K. A. and Venugopal N. **3**: Control of Marek's Disease in the Netherlands, B. H. Rispens et al. Avian Diseases, Vol. 16, No. 1, Control of Marek's Disease (Apr., 1972), pp. 126 -138- **4**: Protection Against Marek´s Disease (MD) by Various Commercial Serotype 1 MD Vaccines. Gabriela Beltran, Charles Hofacre, Sunny Cheng, Virginia Baxter, Guillermo Zavala, Poultry Diagnostic and Research Center, University of Georgia, Athens, GA. AAAP Symposium. July 26-29, 2014. Denver, Colorado **5**: SID/ SSIU Ceva Phylaxia/Study id.: P067-Walkóné Kovács, Tímea Tatár-Kis, Balázs Felföldi, Zalán Homonnay, István Kiss, Vilmos Palya Scientific Support and Investigation Unit, Ceva-Phylaxia Science and Innovation Direction

ceva

Cevac IBird® + Cevac® Mass L

HEALTHY CHICKENS

Cevac IBird® Cevac® Mass L :

- Can be used together by spray from day 1
- 9 weeks duration of immunity
- Reduction of challenge virus in the trachea
- Safe repeat use in lay for Cevac IBird®

MORE PROTECTION

9 weeks duration of immunity from day 1 application

Challenge studies have been performed on commercial layers to observe the impact on onset of immunity and duration of immnunity of application of Cevac IBird® and Cevac® Mass L combination at day of age by spray.

Challenge virus	3 weeks			6 weeks			9 weeks		
	ciliostasis		Shedding reduction	ciliostasis		Shedding reduction	ciliostasis		Shedding reduction
	Vaccinated	Control		Vaccinated	Control		Vaccinated	Control	
793 B	2.9	39.3	5.1*	1.25	37.4	8.1*	1.6	29.6	3*
M 41	6	37.4	4.6*	11.5	40	4*	13.5	33.1	2.9*

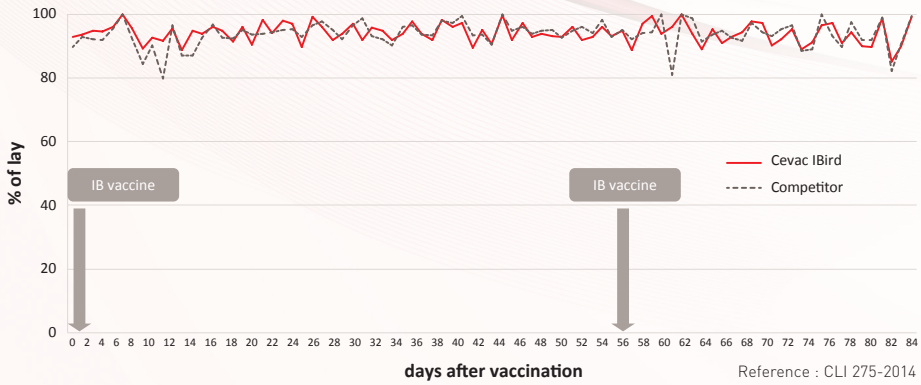
* vaccinated group shedding level was statistically different from control Stat diff p<0.001

The combination of Cevac IBird® & Cevac® Mass L was able to induce strong protection in layers at 3, 6 & 9 weeks after vaccination against 793 B & Mass challenge viruses with significant reduction of challenge virus shedding.

Cevac IBird® safe at day 1

Cevac IBird® safety after day 1 application was monitored based on growth rate of vaccinated pullets and histological examination of the oviduct of the pullets after vaccination. No impact was observed on growth rate & oviduct histology by the vaccination. Cevac IBird® is safe from day 1 by spray.

Cevac IBird® safe repeat use in lay



Reference : CLI 275-2014

Cevac IBird® was applied by spray at 30 & 38 weeks of age on commercial layers which were already immunized against 793 B virus during rearing. The control group was on the existing vaccination program, using a competitor vaccine applied by drinking water.

Cevac IBird® application on commercial layers in production did not induce a drop in egg production, neither an increase in eggshell abnormalities. No lesions on the oviduct were detected on vaccinated hens for both groups. Cevac IBird® is safe to be applied, repeatedly, by spray during lay.

Cevac IBird®

is a live attenuated vaccine (strain 1/96) belonging to 793 B serotype of Infectious Bronchitis Virus

Cevac® Mass L

is a live attenuated vaccine (strain B48) belonging to the Massachusetts serotype of Infectious Bronchitis Virus

LESS IS MORE

Cevac IBird® and Cevac® Mass L induced broad protection

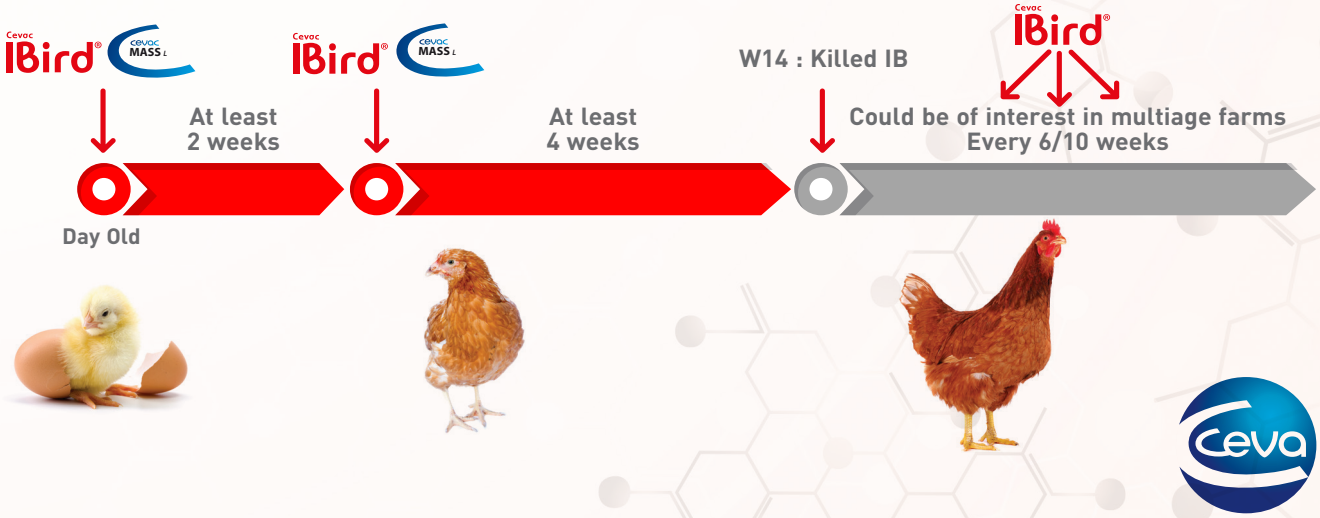
In order to address Infectious bronchitis virus (IBV) diversity, it is a common practise across the world to combined 2 different IB vaccine serotypes at day 1 to achieve a broad protection against field viruses.

The internal Scientific Study Unit of Ceva or external laboratories are continuously testing the efficacy of Ceva IB vaccines against field IB virus isolates.

Cevac IBird® induces strong protection against the 793 B virus strain.
Cevac IBird® in combination with a Massachusetts vaccine strain is able to offer a broader protection for QX, Mass, Q1/J2, Variant 2, Egyptian variant, Malaysian variant, Tunisian variant IT02 Morocco, Taiwanese 1 viruses isolated from different parts of the world.

INFECTIOUS BRONCHITIS UNDER CONTROL FROM THE HATCHERY

Compatible with Cevac Mass L at day 1	→	Broad Protection: Mass, 793 B, QX, Q1, J2, Var2, Malaysian variant, Tunisian variant, IT02, and Taiwanese gpe 1
9 weeks duration of immunity: no need for IBV revaccination in the field	→	Simplification of the vaccination program
Challenge virus Shedding reduction	→	Reduction of the circulation of the field virus
Safe repeat use in lay for Cevac IBird	→	Better control of IB problems in layers
Desvac equipment and CHICK Program	→	Better control of vaccine application



ceva

IMMUcox®5

Coccidiosis Control in a Gel Droplet

- SAFETY
- CONSISTENCY
- SUPERIOR VACCINE UPTAKE

IMMUCOX®5 is designed to help healthy chickens develop immunity against coccidiosis.
IMMUCOX®5 contains live sporulated oocysts of:

• *Eimeria acervulina* • *Eimeria maxima* • *Eimeria tenella* • *Eimeria necatrix* • *Eimeria brunetti*

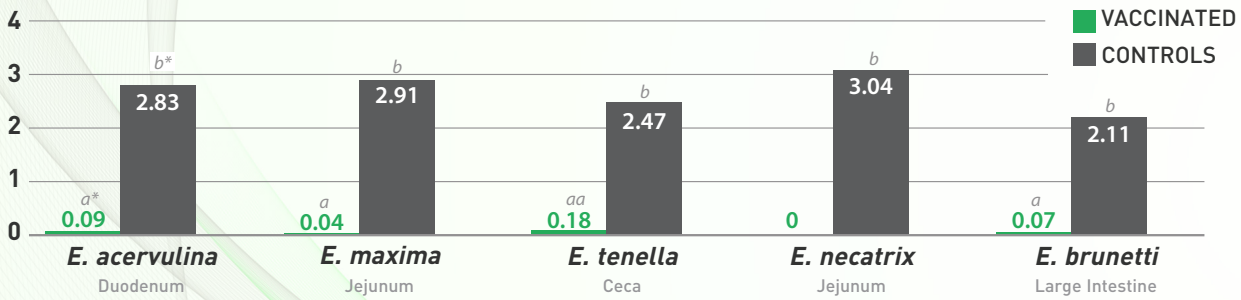
Safety & Efficacy

IMMUCOX®5 is designed to induce strong protective immunity with minimal intestinal damage.

This is achieved by having an ideal number of full-cycle *Eimeria* oocysts in the vaccine.
The ingestion of a low amount of full-cycle oocysts efficiently triggers the immune response.

- Ideal oocyst number: minimal intestinal damage resulting in no detrimental effect on performance
- Full-cycle *Eimeria* species: development of early strong immunity to cocci

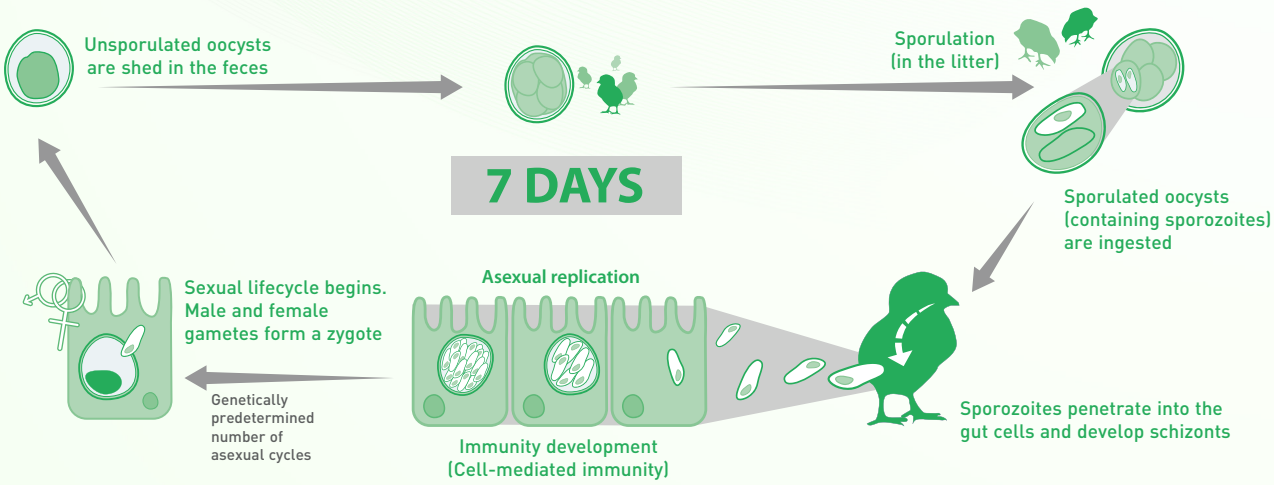
Efficacy Studies: Lesion Score Results (5 days post-challenge)



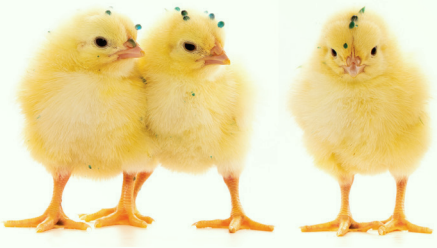
* The values with different superscript letters are significantly different (P<0.05)

Birds were vaccinated in the hatchery with IMMUCOX®5 and challenged 4 weeks after vaccination. IMMUCOX®5 significantly reduced the lesions after the challenge with *E. acervulina*, *E. maxima*, *E. tenella*, *E. necatrix* and *E. brunetti* when compared to non-vaccianted birds.

Coccilife-Cycle



A unique coccidiosis vaccine that perfectly balances safety and efficacy, in a gel droplet to prevent economic losses caused by coccidiosis in long-living birds



LESS IS MORE

Consistency

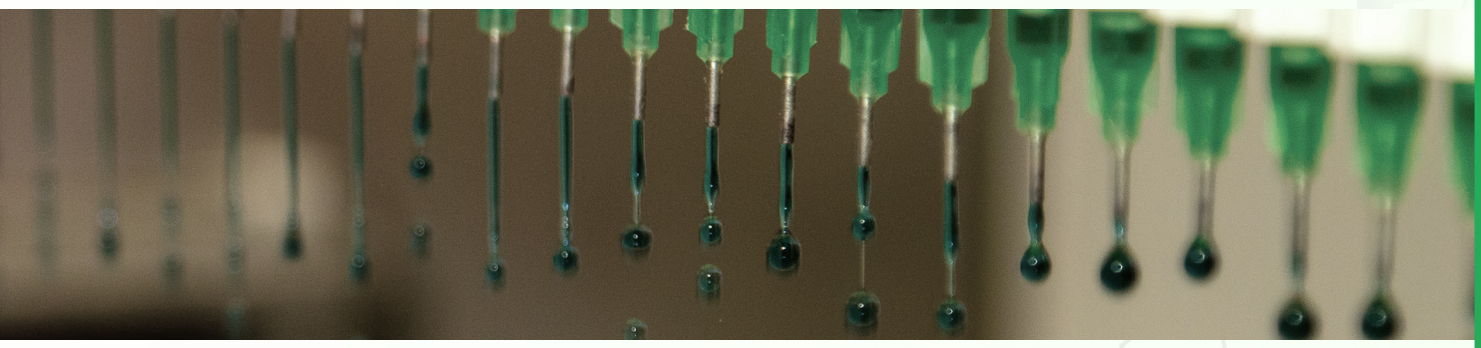
IMMUCOX®5 is designed to maximize consistency in viability and infectivity over the product's shelf like making it SAFE and CONSISTENT.

The viability and infectivity of a coccidiosis vaccine can be affected by the concentration of amylopectin in the parasite. Amylopectin is used by the parasite as a source of energy to survive and to access, invade and develop in their host cells.[1]
The vaccine storage time and storage conditions affect the amylopectin concentration and vaccine parasite replication. IMMUCOX®5 is designed to ensure minimal variation in viability and infectivity during its shelf life, due to a combination of a low amount of oocysts and highly viable oocysts.

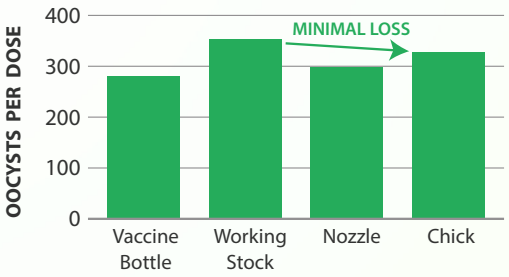
Vaccine uptake

The CevaGel formulation and innovative delivery system ensure a high rate of vaccine uptake and uniform oocyst distribution.

IMMUCOX®5 is applied to chicks using Desvac In-line Duo Spray & Gel and CevaGel technology. The system is audited on a regular basis by the vaccination, service and equipment team with the CHICK program.

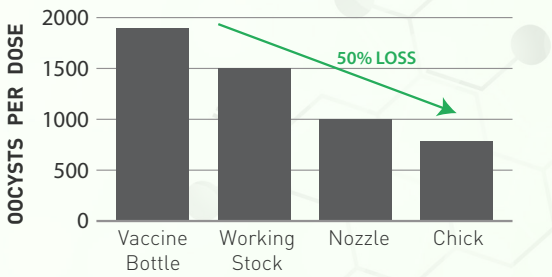


Low Oocyst Dose Vaccine* In Gel Spray Dosages[2]



*IMMUCOX®3

High Oocyst Dose Vaccine In Water Spray Dosages[2]



Conclusion

Gel Spray: No decline in oocyst from working stock to chicks.

Water Spray: 50% of the oocyst is lost during the spray process from working stock and chicks.

1. Nakal, Y. and Ogimoto, K. 1987
2. Adapted from: Tensa; L.R. & Jordan, B.J. 2018, Comparison of the application parameters of coccidia vaccines by gel and spray, Poultry Science 0:1-8

Key Advantages

Effective vaccination against coccidiosis caused by 5 *Eimeria* species economically important to broiler breeders and layers.

Gel droplet prevents oocysts sedimentation and improves vaccine uptake.

The ideal oocyst number causes minimal intestinal damage resulting in no detrimental effect on performance.

cevac CORYMUNE 4 K

cevac CORYMUNE 7 K

Cevac® Corymune 4K

- Unique broad vaccine combination against Infectious Coryza (A, B & C) and Salmonella Enteritidis
- Mild adjuvant to optimize bodyweight development
- Suitable for early vaccination

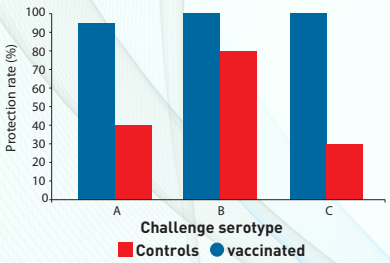
Cevac® Corymune 7K

- Unique broad vaccine combination for protection against Infectious Coryza (A,B &C), Salmonella Enteritidis, ND, IB and EDS.
- Simplifies the vaccination schedule
- Booster adjuvant for long lasting immunity

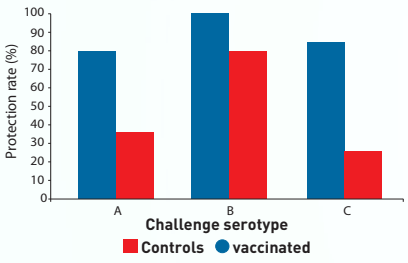
Efficacy of Cevac® Corymune Against Infectious Coryza

In a trial carried out using commercial brown layer pullets, the birds were distributed into a vaccinated and a control group. The vaccinated group received Cevac® Corymune 4K at 11 weeks followed by a booster vaccination with Cevac® Corymune 7K at 15 weeks. Both groups were challenged at 20 weeks, 35 weeks and 55 weeks with high doses of virulent *Avibacterium paragallinarum*, serovar A, B and C. The clinical signs of Coryza were then monitored for 1 week post challenge.

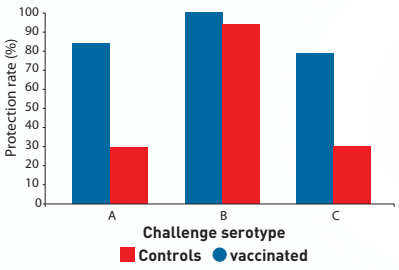
Infectious Coryza challenge (20 weeks) in commercial pullets vaccinated using Cevac® Corymune 4K and Cevac® Corymune 7 K



Infectious Coryza challenge (35 weeks) in commercial pullets vaccinated using Cevac® Corymune 4 K and Cevac® Corymune 7 K



Infectious Coryza challenge (55 weeks) in commercial pullets vaccinated using Cevac® Corymune 4 K and Cevac® Corymune 7 K



Conclusion

Cevac® Corymune 4K & Cevac® Corymune 7K provides good clinical protection at 20, 35 and 55 weeks of age against serovars A, B and C after a severe Infectious Coryza challenge.

Reduction of Shedding of *Salmonella* Enteritidis

In this trial, *Salmonella*-negative commercial pullets were distributed into two in two groups. The vaccinated group received Cevac® Corymune 4K at 11 weeks and Cevac® Corymune 7K at 15 weeks. The control group did not receive any Salmonella vaccine.

At week 39, a massive oral challenge (10^{10} CFU/bird, 1 ml) was given. External shedding of the challenge strain was measured at 4 and 10 days post challenge.

		Vaccinated group	Control group
4 days post challenge	Caecal content	< 100 UFC/mL	100.000 UFC/mL
	Faeces	<100 UFC/mL	10.000.000 UFC/mL
10 days post challenge	Faeces	<100 UFC/mL	1.000.000 UFC/mL

Conclusion

Cevac® Corymune 4K & Cevac® Corymune 7K vaccination :
· Provides a significant reduction in fecal excretion of SE after challenge
· Helps to reduce SE shedding which reduces eggshell and environmental contamination risks

UNIQUE VACCINES COMBINATION TO PROTECT AGAINST CORYZA, SALMONELLA, ND, IB AND EDS

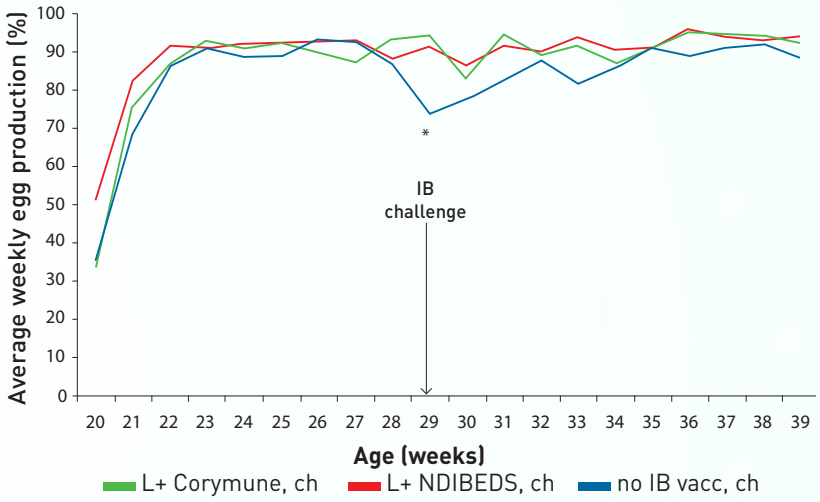
Efficacy of Cevac®Corymune 7K Against an IB challenge

In this trial commercial brown layer pullets were used; the 2 vaccinated groups received 3 live IB vaccines (Mass type) and Cevac® Corymune 7K or a basic ND, IB EDS combination vaccine as inactivated booster vaccine.

The control group was not vaccinated for IB. At week 29 all groups received an IB challenge (M41 strain) by intra-tracheal route.

All groups were observed for 10 weeks post-challenge on production parameters and clinical signs; the results are displayed below.

Cevac® Corymune 7K efficacy against IB challenge at 29 weeks of age



Conclusion

Cevac® Corymune 7K provided significant protection against production drops caused by IB challenge and protection was similar to reference vaccine consisting of IB, ND & EDS at 29 weeks of age.

Recommended Vaccination Schedule

1st application (8-12 weeks of age)	Booster application between 2 to 4 weeks before onset of production 14 to 18 weeks of age	Administration and dosage
Cevac® Corymune 4K	Cevac® Corymune 7K	Intramuscular route (breast muscle) or subcutaneous route (under the skin of the neck). 0.5 ml per bird

Cevac® Corymune 4K and Cevac® Corymune 7K

- **Convenience** by combining protection against *Salmonella enteritidis*, Infectious Coryza (A, B & C), ND, IB and EDS to reduce the number of bird handlings
- **Broad protection**
- **Strong, long-lasting immunity**
- **Clinical protection** against the 3 serovars - A, B and C - of Infectious Coryza

VECTORMUNE® FP LT RANGE

Ceva's Approach to ILT Control

Ceva Animal Health has developed safe and effective ILT vaccines without the risks associated with conventional live ILT vaccines. Our vector ILT vaccine: Vectormune® FP LT and Vectormune® FP LT +AE are **safe and effective** in ILT, Fowl Pox and AE prevention.

Vectormune® FP-LT is available alone or in combination with AE

Vectormune® FP LT is a live Fowl Pox vector vaccine in which 2 important ILT virus genes have been inserted.

Vectormune® FP-LT is available alone or in combination with AE in the market.
When the live Fowl Pox virus in our vaccine replicates in the bird it also expresses these important ILT virus proteins, immunizing the birds against Fowl Pox and ILT.

Using a Fowl Pox vector is a safe approach to ILT immunization as it avoids respiratory reactions, bird to bird passage, persistent infections and reversion to virulence.

Vectormune® FP LT Range Has been used successfully in

46 COUNTRIES

ACROSS THE GLOBE

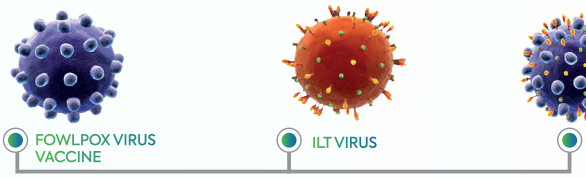


Illustration showing the development of Vectormune® FP-LT vaccine.

VECTORMUNE® FP LT VIRUS VACCINE combined with a live Avian Encephalomyelitis (AE) vaccine.

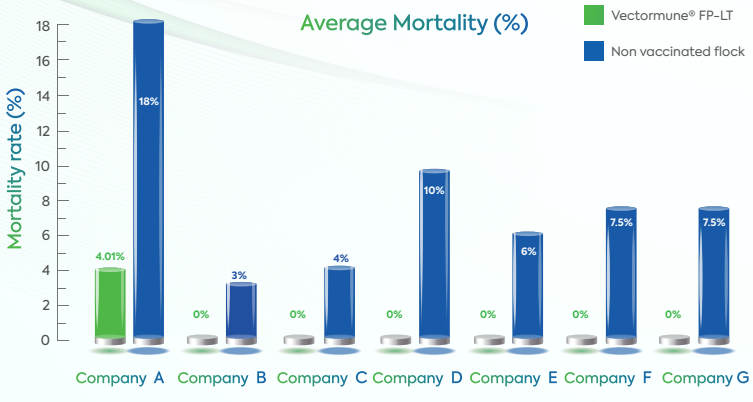
Efficacy in Layer

This field experience was conducted to evaluate the benefits of Vectormune® FP-LT vaccinated flock versus non vaccinated.

7 million commercial layers in 32 farms from 7 companies.

The environmental ILT infectious pressure was high. No live ILT vaccine had ever been used in this area.

Mortality results comparison of a Vectormune® FP-LT vaccinated layer flocks vs non vaccinated flocks per company.



In Vectormune® FP-LT vaccinated flocks mortality was 4-5 times lower in comparison with previous flocks not vaccinated with Vectormune® FP-LT the extra revenue per 1,000 pullets in this case was +542€

Based on 2018 cost-benefit calculations; FCR 2.1, Feed price 0.20 €/kg, Egg price 0.8 €/kg egg, Eggs hen housed 420 eggs, Average egg weight 62.9 g, Hen price at 70 weeks of age 0.1€/hen,

Source; Ceva Internal data, Ceva Saúde Animal Ltda. Paulínia, SP – Brazil Luiz Sesti, Fernando Resende,

PERFECT BALANCE

BETWEEN SAFETY AND EFFICACY

LESS IS MORE

Safety

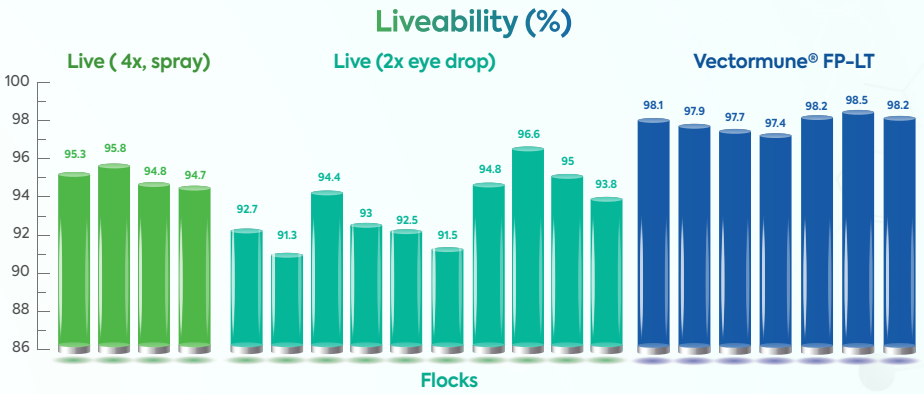
Full Protection against ILT with Vectormune® FP-LT with no post vaccination reaction

Live ILT CEO vaccines have been used many years in commercial layer flocks during rearing period. Classical post mortem lesions were observed, trachea plugs with blood and more than 6% mortality were observed due to PVR. Vectormune® FP-LT vaccination started in December 2017

Historical Vaccination Program:

- Live ILT vaccine 4x by spray route
- Live ILT CEO vaccine, 2x by eye drop route,
- Vectormune® FP-LT 1x by wing web route

Liveability parameters during the rearing period (100 days) are summarized in the table.



Results

Vectormune® FP-LT application at 30-35 days of age by wing web provides full protection against ILT and Fowl Pox with no post vaccination reaction

5% less mortality during rearing period
+ 200.000 more laying hens
1 hen produces 320 eggs per year
Better disease control has contributed to save **5 M€** per year*

Source: Artur KHOLDOENKO, and Ceva Russia. Field challenge of ILT and its Economic impact in commercial layer flocks in Russia

**Calculation bosed on Egg price – (0,07 €)*

Vaccination Schedule

vectormune FP LT	FROM 1 WEEK OF AGE	4 Weeks Before Transfer To Production
vectormune FP-LT+AE	FROM 8 WEEK OF AGE	4 Weeks Before Transfer To Production

FEATURES AND BENEFITS

NO SIDE EFFECT

- Vectormune® FP-LT is a live fowl pox vector vaccine. It does not induce any post vaccination reaction due to ILT live vaccine replication: no risk of rolling ILT infection.
- Vectormune® FP LT vaccine neither spreads bird to bird nor reverts to virulence

EFFECTIVE PROTECTION

- Vectormune® FP-LT induces a strong immunity against ILT, Fowl Pox in a single application.
- Vectormune® FP-LT+AE induces a strong immunity against ILT, Fowl Pox, AE in a single application

CONTROL OF YOUR COSTS

Decreased bird handling; 1 application protects against 3 diseases

- NO ILT rolling infection : Better uniformity & NO need of antibiotic usage to control post vaccination reaction.

ceva

vectormune FP MG

vectormune FP MG AE

Impact Of *Mycoplasma gallisepticum* Infection

Mycoplasma gallisepticum (MG) is a major respiratory disease to poultry species worldwide, with a huge economic impact. Mycoplasma ranks number 6 among top poultry diseases in terms of economic losses *(World Bank)*

Mycoplasma gallisepticum Control

Vaccination: An Important Tool To Control MG

Strict biosecurity with well implemented hygiene procedures are essential to control MG. Furthermore, vaccination has been widely used as a tool to protect against clinical signs and prevent egg production losses. There are commercially available live and killed vaccines. However, there are concerns associated with their safety, efficacy and convenience. Moreover, live vaccines can be adversely affected by antibiotic treatment and there is a risk of spreading to neighboring flocks as well.

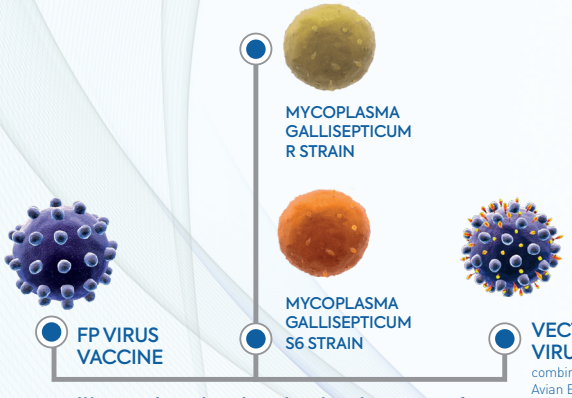


Illustration showing the development of Vectormune® FP-MG vaccine.

Have been used successfully in

vectormune FP MG

vectormune FP MG AE

40 COUNTRIES

ACROSS THE GLOBE

FEATURES AND BENEFITS

SAFE

- Vectormune® FP-MG is a live fowl pox vector vaccine. It does not induce any post vaccination reaction due to MG live vaccine replication.
- No transmission, shedding or reversion to virulence
- No interference with other respiratory vaccines
- Safe to use in layers, breeders and turkeys

BROAD PROTECTION AND COST CONTROL

- Vectormune® FP-MG is inducing a strong immunity against MG, fowl pox (+AE) in a single application. One vaccine provide protection up to 3 diseases, clearing the vaccination schedule

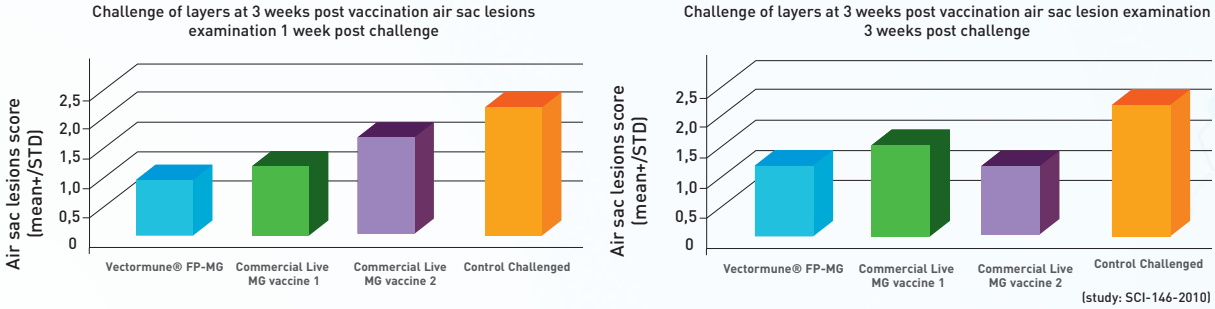
COMPATIBILITY

- No interference with MG serological monitoring
- Compatible to use with antibiotic medication programs

MAKING MG PROTECTION SAFER AND EASIER

Efficacy of Vectormune® FP-MG

Vectormune® FG-MG efficacy was evaluated against MG in commercial layer and compared to other live MG vaccines. Group 1 of commercial Hy-line brown laying pullets vaccinated at 9 weeks of age with Vectormune® FP-MG by wing web, group 2 vaccinated with commercial live MG vaccine 1 by eye drop route, Group 3 vaccinated with commercial live MG vaccine 2 by eye drop route, Group 4 was kept as unvaccinated control group. Three weeks' post-vaccination challenge with *Mycoplasma gallisepticum* was carried out and the protection was assessed based on clinical signs of MG such as: tracheal rales, nasal discharge or coughing in addition to the air sac lesion score (0 – 4).



Vectormune® FP-MG strongly protected the air sacs against lesions induced by the MG challenge strain

Benefits of Vectormune® FP-MG+AE : Better MG Control

A trial was carried out in layer farm selected for its history of MG infection.

Two rearing houses (P2 and P3, 61000 hens each) were vaccinated with Vectormune® FP-MG+AE by wing web route at 8 weeks of age.

Performances before and after vaccination were overall the same for both houses and remained at high level until transfer at week 16 (BW=1480 g; Uniformity 88%) showing the full safety of the vaccine and vaccination process.

No clinical sign or egg-drop could be seen during the whole production period,

The laying performance reached at 77 weeks of age an average of **356.9 eggs** per hen with a feed conversion of 2.21 and 7.54% mortality. These data clearly demonstrated the efficacy of the vaccine.

The overall production performances of the two flocks, vaccinated with Vectormune® FP-MG+AE during this trial showed a clear benefit in comparison of those obtained in the same houses during the last two production cycles.

Number of eggs per hens housed comparison of vaccinated with Vectormune® FP-MG+AE (flock 1 and flock 2) versus non vaccinated flocks.

Year	Flock 1		Flock 2	
	Number of extra eggs per hens housed	Extra revenue per 1000 hens*	Number of extra eggs per hens housed	Extra revenue per 1000 hens*
2010	**+9.5**	**297 €**	**+6.3**	**197 €**
2011	**+5.4**	**169 €**	**+2.2**	**69 €**

**Calculation assumptions: Eggs hen housed 357 eggs, Average egg weight 62,9 g, FCR 2.21, Feed price 0.20 €/kg, Egg price 1 €/kg.*

Vectormune® FP-MG+AE clearly improve safety & efficacy balance. And provide better return on investment through better performances versus non-vaccinated birds.

Source: Field usage of vector FP-MG vaccine in a Moroccan layer farm. M. MOUAHID1, M. BOUZOUAIA2, V. TURBLIN2 and E. BADIN3 1 Cabinet Vétérinaire Mouahid, Témara, Morocco.2 CEVA ANIMAL HEAL,3 CEVA SANTE ANIMALE, Z.I. Ouled Saleh, Bouskoura, Morocco*

SALMOVAC® 440

EARLY & BROAD PROTECTION

LONG LASTING IMMUNIZATION AGAINST SALMONELLA ENTERITITIS AND SALMONELLA TYPHIMURIUM

Salmonella Control

Salmonella remain a major issue for food safety control all over the world.

Salmonellosis is the second most common zoonotic disease after campylobacteriosis in the European Union *(1)* In the European Union, over 91,000 salmonellosis cases are reported each year. European food safety agency has estimated that the overall economic burden of human salmonellosis could be as high as €3 billion a year. Eggs & egg products are the main source of Salmonella foodborne outbreaks confirmed (45.6 %)

The top 5 Salmonella serovars in human reported cases in 2018 in EU are :

	Nb of cases	%
Salmonella enteritidis (SE)	39 7981	49.9
Salmonella Typhimurium (ST)	10 395	13
Salmonella typhimurium monophasic	6 427	8.1
Salmonella infantis (SI)	1 859	2.3
Salmonella Newport	1 086	1.4

Vaccination: An Important Tool To Control Salmonella

Salmonella vaccines can reduce organs colonization and shedding that contribute to reduce possible vertical transmission to eggs and progeny. However, they do not prevent the Salmonella to enter the house that is why strict biosecurity measures with well-implemented hygiene procedures are essential in order to reduce the risk. Live and killed Salmonella vaccines are available on the market. They do contain Salmonella enteritidis or typhimurium serotypes.

Ceva Approach For SE & ST Control

Salmovac® 440 is a live attenuated Salmonella entitidis vaccine strain :

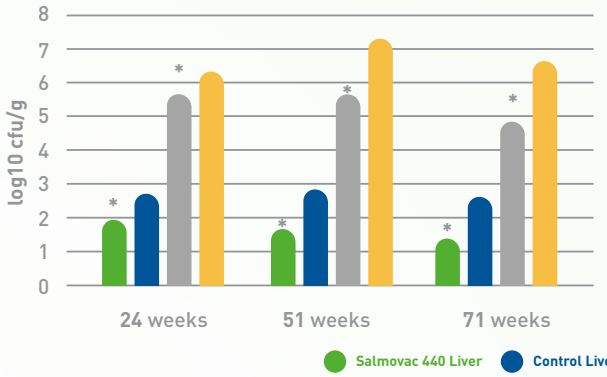
- It is a deleted strain which requires Adenine & Histine for growth,
- For Layers & broiler breeders,
- It needs 3 applications : First week, W6 & W11 of age by drinking water,
- It is inducing active immunization of chickens to reduce colonization, persistence and invasion of the intestinal tract and internal organs by ***Salmonella Enteritidis and Salmonella Typhimurium***
- Onset of immunity is 1 week after first vaccination and duration of immunity is 63 weeks for SE, 60 weeks for ST after third application

Salmovac® 440 protection has been evaluated for several SE & ST isolates

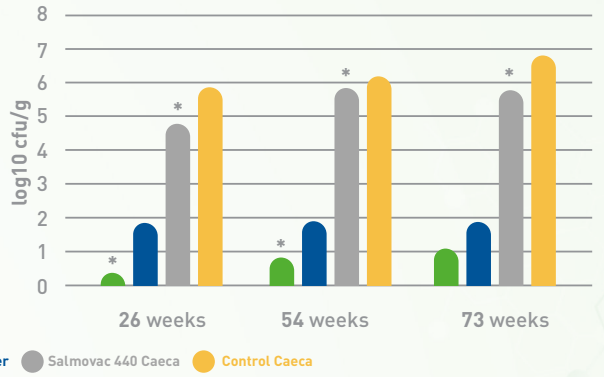
Commercial brown pullets were vaccinated at week 1, 7 and 13 with Salmovac® 440 by oral route *(2)*.
At 3 time points vaccinated and control birds were challenged, with either a field Salmonella Enteritidis isolate (147 N, 5 108 cfu /dose) or a field Salmonella Typhimurium isolate (27N, 1 109 cfu /dose) per oral gavage

LESS IS MORE

Challenge results challenge with Salmonella Enteritidis, 7 days post challenge



Challenge results challenge with Salmonella Typhimurium, 7 days post challenge



Salmovac 440 Liver | Control Liver | Salmovac 440 Caeca | Control Caeca

**Significant difference between the vaccinated group and the control group (Mann Whitney U test, one-tailed test). significance level p < 0.05.*

Salmovac® 440 vaccination program was able to demonstrate a significant reduction of the colonisation of the liver and caeca mucosa from S. Enteritidis and S. Typhimuirium challenge strains up to 71/73 weeks of age.

Differentiation between the vaccine and a field isolate

Salmovac® 440 is an adenine and histidine auxotrophic vaccine strain, therefore you can by usage of a dedicated growth media kit distinguished the vaccine strain from field strain.

Strain	Medium A without Adenin & Histidine	Medium B without Adenin & Histidine	Appearance
Vaccine Strain	No Growth	Growth	
Field Strain	Growth	Growth	
Field Strain (auxotrophic)	No Growth	No Growth	

You can use as well molecular detection technic to differentiate vaccine strain from field strain.

FEATURES AND BENEFITS

BROAD PROTECTION
Salmovac® 440 is a unique live SE vaccine, which is able to reduce colonisation, persistence and invasion of the intestinal tract and internal organs by Salmonella Enteritidis and Salmonella Typhimurium up to 71/ 73 weeks of age after the third vaccination at 11 weeks. In 1 vial and 1 Salmonella strain you can tackle both SE & ST problems.

DIFFERENTIATION VACCINE FROM FIELD ISOLATE
Salmovac® 440 vaccination does not interfere with serological testing for Salmonella Gallinarum by rapid plate agglutination method
Salmovac® 440 due to its adenine – histidine auxotrophy can be differentiated from field SE strains by using appropriate growth test or molecular biology method.

1. The European Union One Health 2018 Zoonoses Report, EFSA Journal 2019;17(12):5926
2.Berliner und Münchener Tierärztliche Wochenschrift 124, Heft 3/4 (2011), Seiten 8–93

cevac
MEGAMUNE *K*

Cevac Megamune ® K is a combined inactivated vaccine for the active immunization of chickens against Infectious Bronchitis, Avian Metapneumovirus, Egg Drop Syndrome virus and Newcastle Disease

Disease Protection

Cevac Megamune ® K is recommended for the vaccination of layer and breeder type chicken flocks, in order to:

- Reduce egg drop, respiratory signs and virus shedding caused by the Massachusetts and QX-like serotypes of Infectious bronchitis virus.
- Reduce respiratory signs (e.g. signs linked to Swollen Head Syndrome) and virus shedding caused by Avian Metapneumovirus.
- Reduce egg drop caused by the Egg drop syndrome virus.
- Reduce mortality, clinical signs, lesions and virus shedding caused by Newcastle disease virus.

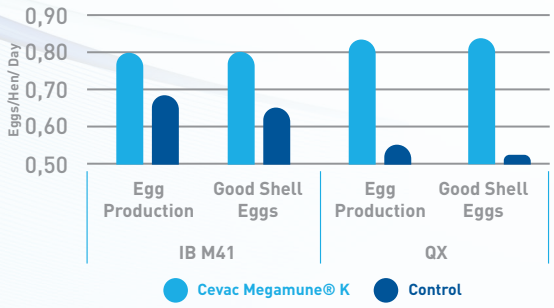
COMPONENT	LIVE PRIMING	Onset of Immunity (Weeks after vaccination)	Duration of immunity (Weeks after vaccination)
IB M-41	Yes	4	43
IB QX	**Yes**	**4**	**43**
AMPV	Yes	4	46
EDS	**NA**	**4**	**68**
ND	Yes	3	46

Infectious Bronchitis- Efficacy

Commercial layers were vaccinated with Cevac Megamune ® K by IM route at 17 weeks of age. IB challenges have been conducted 4 weeks after vaccination with either IBV M41 or IB QX serotype viruses. Vaccinated group compared with non-vaccinated group.

- Onset of Immunity is established 4 weeks post vaccination for both Mass and QX
- Duration of Immunity proved up to 60 weeks of age
- Ciliary activity in trachea of the control birds ceased almost completely seven days after challenge. At the same time the vaccinated animals were protected against the same challenge. The ciliary scores were significantly lower in Cevac Megamune group as compared to the control group.
- Egg production and egg shell quality was significantly higher in the Cevac Megamune® K vaccinated groups.

Impact of IB Challenge on Egg Production Parameters After Challenge at 21 Weeks of Age



Cevac Megamune® K vaccination was able to prevent Egg drop after IBV challenges during production and reduce eggshell quality disorders after challenges with IB virusses of QX or Mass serotype.

Cevac Megamune ® K vaccination reduced respiratory clinical signs, damage of trachea and shedding caused by the QX-type strains and Massachusetts-type strains of Infectious bronchitis virus.

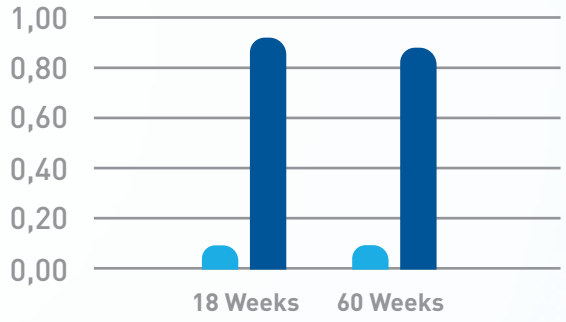
PROTECT THE HEALTH OF YOUR FLOCK IN A SINGLE INJECTION, REDUCE CATCHING STRESS AND HANDLING OF BIRDS

SHS (aMPV)- Efficacy

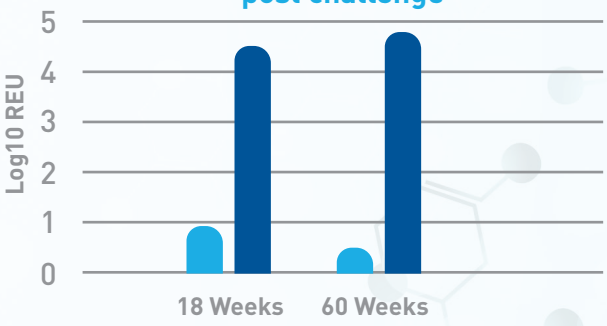
Commercial layers were vaccinated with Cevac Megamune ® K by IM route at 14 weeks of age. TRT challenges have been conducted 4 weeks after vaccination with TRT Italy88 strain. Vaccinated group was compared with non-vaccinated group.

- Onset of Immunity is established 4 weeks post vaccination
- Duration of Immunity proved up to 60 weeks of age
- Clinical observation after challenge:
  - All birds were examined for clinical signs individually on days 3, 4, 5, 6 and 7 post challenge.
  - The clinical signs and their severity were scored:
- Significant reduction of clinical signs and virus shedding 3 days post-challenge.

Clinical Observation Score Post Challenge



Shedding of challenge virus 3 Days post challenge



Cevac Megamune ® K Control

Cevac Megamune® K was able to reduce significantly the respiratory clinical signs caused by virulent avian metapneumovirus.

Cevac Megamune ® K vaccination was also able to reduce significantly shedding of the challenge virus.

cevac MEGAMUNE K

Egg Drop Syndrome-Efficacy

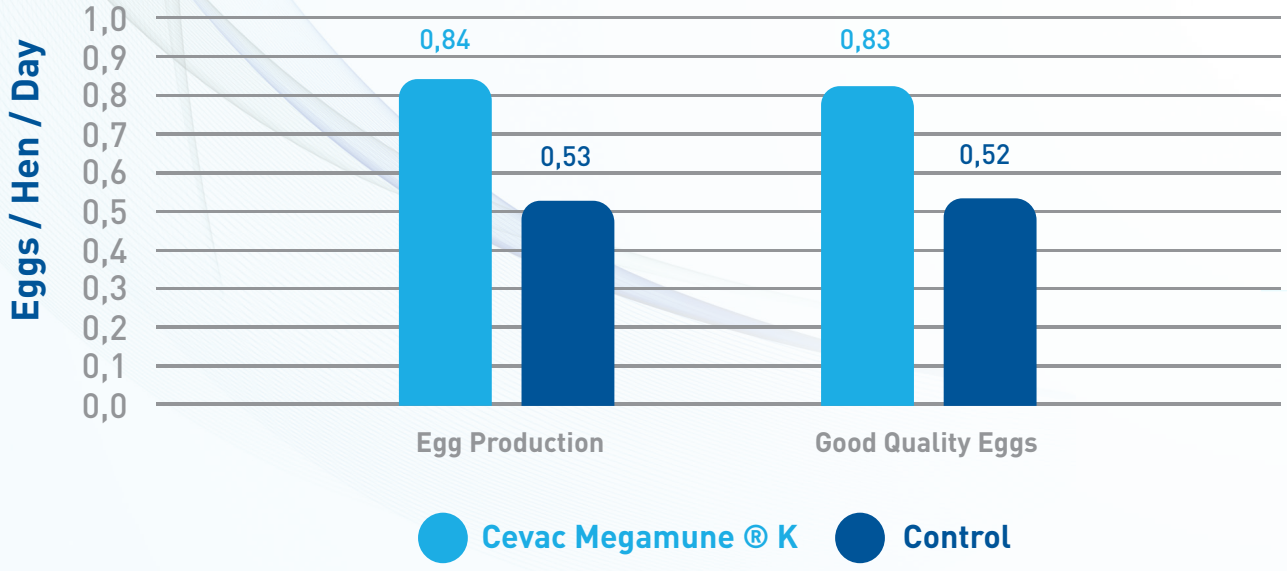
Commercial layers were vaccinated with Cevac Megamune® K by IM route at 17 weeks of age. EDS challenges have been conducted 4 weeks after vaccination with EDSV Pennsylvania strain. Vaccinated group was compared with non-vaccinated group.

- The onset of immunity study demonstrated that chickens are protected from EDS challenge by 4 weeks after vaccination.
- The duration of immunity has been demonstrated up till 85 weeks of age after vaccination.
- HI titers at:
  - 4 weeks PV – 6.6 log2
  - 68 weeks PV – 4.5 log2

Significant protection against EDS challenge virus

Remove reduction of challenge virus, 3 days' post challenge

Impacts of EDS challenge on Egg Production Parameters After Challenge (66-68 weeks vs 68-72 Weeks)



Cevac Megamune ® K was able to reduce a drop in egg production and to reduce eggshell quality disorders caused by virulent Egg Drop Syndrome virus.

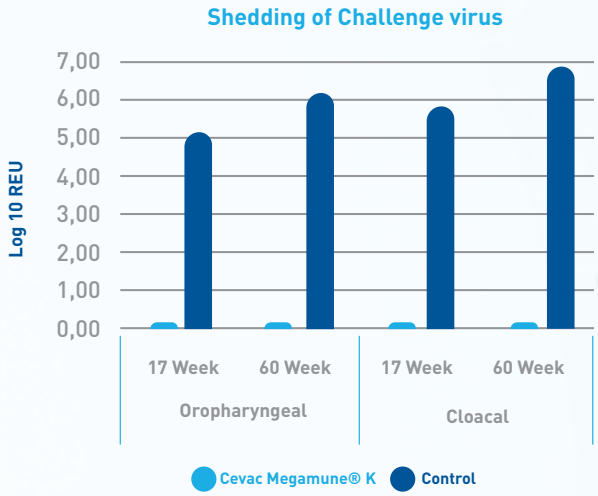
PROTECT THE HEALTH OF YOUR FLOCK IN A SINGLE INJECTION, REDUCE CATCHING STRESS AND HANDLING OF BIRDS

LESS IS MORE

Newcastle Disease- Efficacy

Commercial layers were primed with live ND vaccine and boost with Cevac Megamune ® K by IM route at 14 weeks of age. ND challenges have been conducted 3 weeks after vaccination with NDV Herts 33/56 strain. Vaccinated group was compared with non-vaccinated group.

- 100% ND protection
- Onset of immunity study demonstrated that chickens are protected from virulent ND challenge by 3 weeks after vaccination.
- Duration of immunity has been demonstrated up till 60 weeks of age
- Significant reduction of shedding of challenge virus after challenge
  - The challenge virus content in swab samples was measured by quantitative real-time PCR and is given in REU (Relative equivalent unit).
- HI titers post-vaccination:
  - 9.9 log2 at 17 Weeks
  - 8.2 log2 at 60 weeks



Cevac Megamune ® K offered the best protection against ND and significant reduction of shedding of Newcastle disease virus challenge.

Recommended Vaccination Program - Pullets

Day- Old
Cevac Mass L &
Cevac IBird L Spray

Week 5
Live aMPV vaccine

Week 9
Cevac Mass L &
Cevac IBird L Spray

Week 14
Cevac Megamune® K

- Reduces mortality, clinical signs, lesions and virus shedding caused by Newcastle disease virus
- Reduces egg drop, respiratory signs and virus shedding caused by the Massachusetts and QX-like serotypes of Infectious bronchitis virus
- Reduces egg drop caused by the Egg drop syndrome virus
- Reduces respiratory signs and virus shedding caused by Avian metapneumovirus.

ceva

Ceva, Global Leading Veterinary Company

Ceva is one of the fastest growing top 10 animal healthcare companies.

CEVA HAS MULTIPLIED ITS SIZE
x10 SINCE 1999

#1
In hatchery vaccination

#2
Global supplier of poultry vaccines

23 Billion
Doses of new technology hatchery vaccines used in 2019

6,200 EMPLOYEES WORLDWIDE

800
Poultry professionnals

180
Vet specialists close to you

175
Hatchery specialists at your service

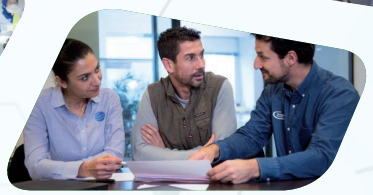


Monitoring tools validated : Elisa IDvet, Biocheck, PCR
SOP for monitoring
Reporting template







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