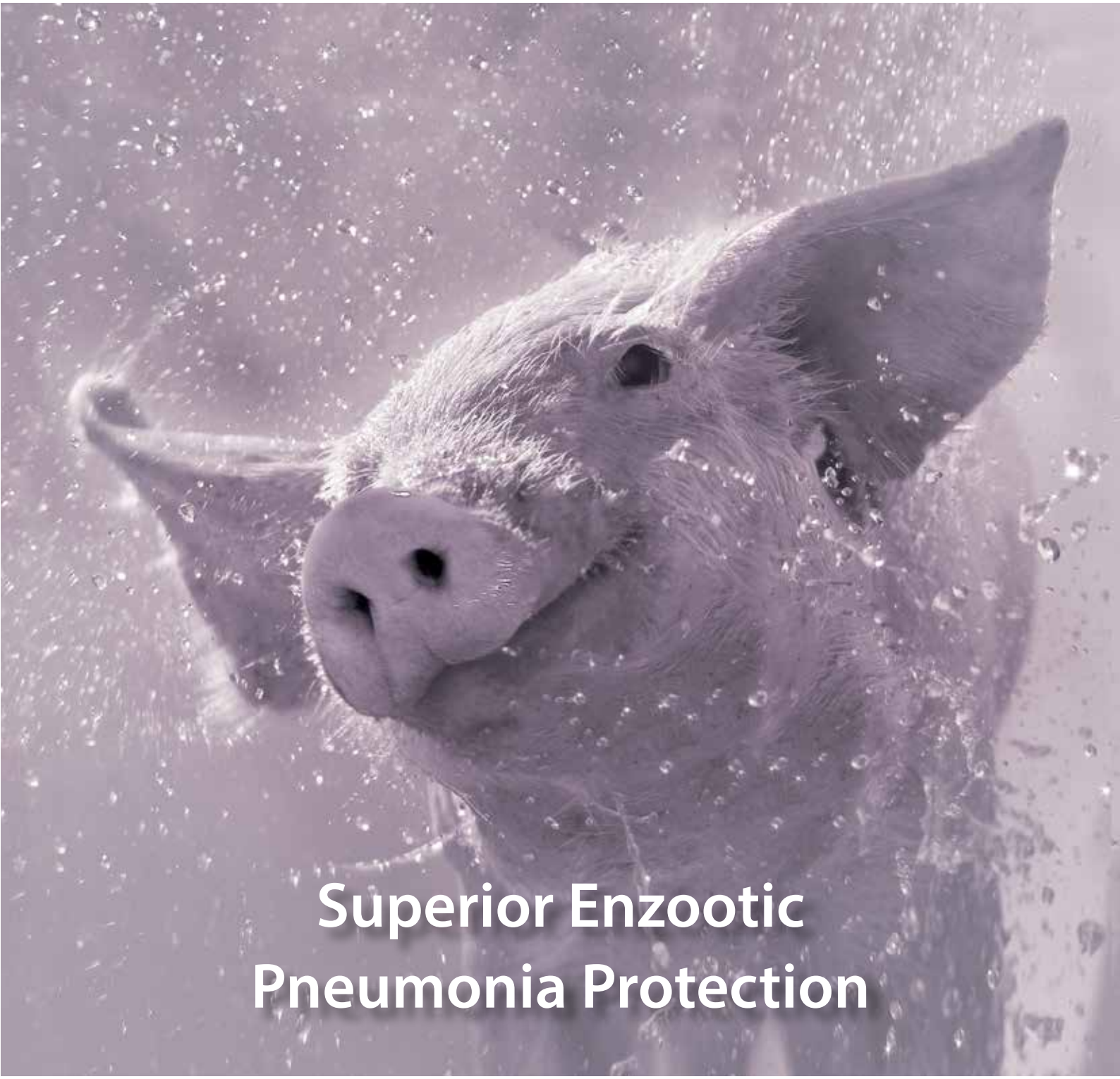
Hyogen®

WITH Imuvant™



Superior Enzootic Pneumonia Protection

Ceva LUNG PROGRAM

Ceva

M.hyo : a real economical problem for pig farmers

***Mycoplasma hyopneumoniae*, associated with enzootic pneumonia, plays a major role in the porcine respiratory disease complex (PRDC) and causes huge economic losses. A 17% decrease in daily weight gain and a 14% decrease in feed efficiency in herds with enzootic pneumonia has been reported[1].**

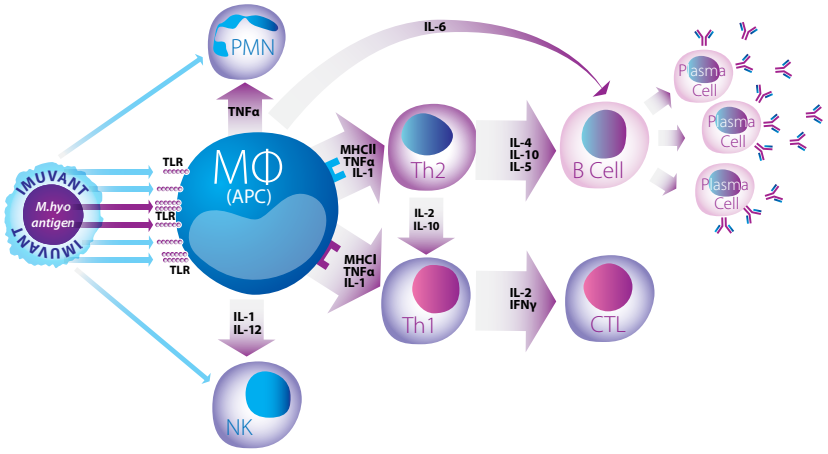
***M. hyopneumoniae* is unable to penetrate and live within host cells but does colonize the mucosal surface of the ciliated epithelium of the trachea and bronchi of pigs. In addition to the detrimental effect on the cilia, *M. hyo* infection attracts lymphocytes and macrophages into the lungs resulting in pneumonia. Protection against the infection requires complex activation of the host immune system.**

Hyogen® : protect your pigs against *Mycoplasma hyopneumoniae*

After a single injection, Hyogen® provides effective protection against *M. hyo* due to the potent stimulation of the immune system by the antigen originated from Ceva *M. hyo* strain BA 2940-99 along with the adjuvant, Imuvant™.

Ceva proprietary strain BA 2940-99: To determine the best option, for a new vaccine, Ceva has decided not to use the old J strain but to make a survey to find a circulating virulent strain reflecting current field situation. The lab has also worked on proteomic and antigenic characterization of the strain to induce high level of immunity.

Imuvant™ is a unique Ceva adjuvant composed of a non-toxic lipopolysaccharide (LPS) from J5 *E. coli* together with a mineral oil in water emulsion that forms a complex and highly efficient immunostimulant[2,3]. This stimulation is due to the oil in water formula acting as a direct delivery system, which promotes the uptake of antigen by Antigen Presenting Cells (APC). At the same time, the LPS component of Imuvant™ stimulates the innate immune system while simultaneously enhancing the specific response to mycoplasma antigen via B and T lymphocyte activation pathways[4].



Innate, Humoral and Cell Mediated Immunity

Cellular Immunity Hyogen® vaccinated pigs had significantly higher mean *M. hyo* specific, IFN γ producing, white blood cell counts as compared to the controls[5].

Mean Number of Antigen Specific White Blood Cells / 6 log 10 Peripheral Blood Mononuclear Cells

	Day 13 *after vaccination*	*Day 90* *after vaccination*	*Day 175* *after vaccination*
Hyogen® Vaccinated	23.75	25.31	10.38
Control	0.56	1.64	2.0

Humoral imunity Hyogen® also elicits a significant early and long lasting antibody response after vaccination as demonstrated in both onset of immunity and duration of immunity studies[6].

Mean Antibody Titer Post Vaccination (EU/ml)

	Day 0	*Day 15* *after vaccination*
Hyogen® Vaccinated	Negative	2.4
Control	Negative	Negative

Study 1

	Day 0	*Day 175* *after vaccination*
Hyogen® Vaccinated	Negative	6.1
Control	Negative	Negative

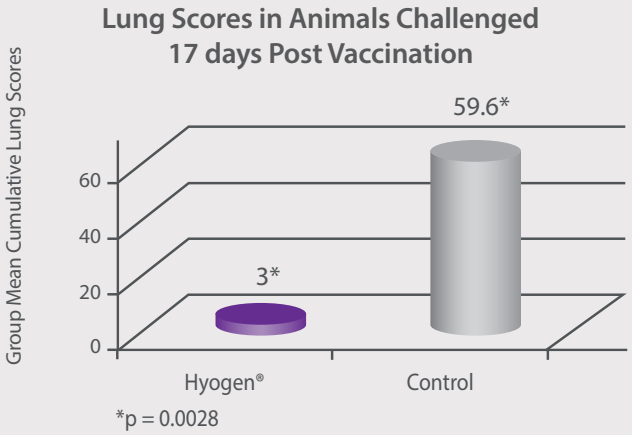
Study 2

IMUVANT™ INCREASES THE DEFENSE OF PIGS VACCINATED WITH HYOGEN® AGAINST MYCOPLASMA HYOPNEUMONIAE

PROTECTION FROM

17 days
POST VACCINATION

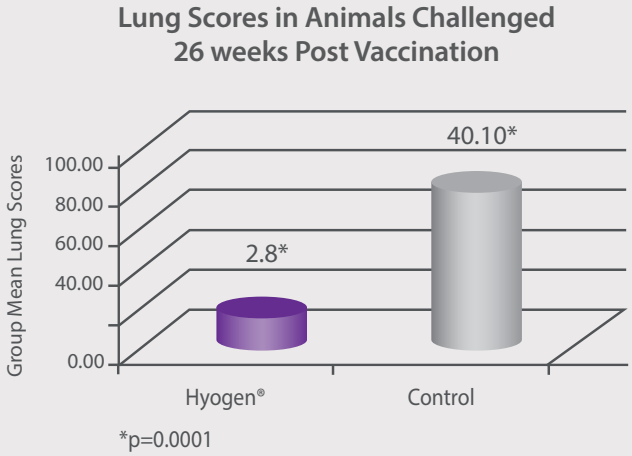
In a clinical trial seronegative 3 week old pigs were either vaccinated with Hyogen® or served as non-vaccinated controls. All animals were challenged with *M. hyopneumoniae* day 17 post vaccination, and euthanized and necropsied on day 46. Hyogen® vaccinated animals had **19.9 times lower lung scores** than the non-vaccinated controls ($p = 0.0028$)[7].



PROTECTION UNTIL

26 weeks
POST VACCINATION

Seronegative pigs were vaccinated with Hyogen® at three weeks of age or served as non- vaccinated controls. Then 26 weeks after vaccination both groups were challenged with a virulent strain of *M. hyopneumoniae* and after 4 weeks were euthanized and necropsied. The Hyogen® vaccinated group had **14.32 times fewer lung** ($p=0.0001$)[6].



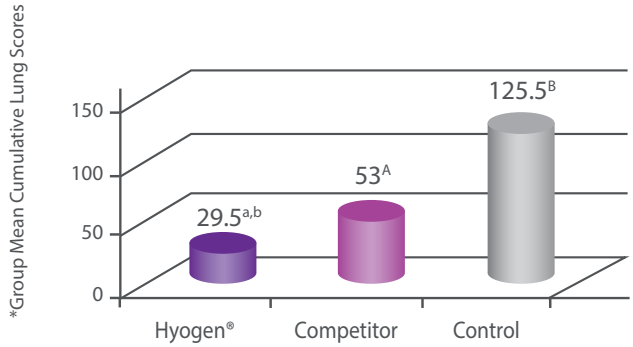
IN THE FIELD

Superior EFFICACY

Protection of lungs

In a field study involving 300 piglets on a farm where *M. hyopneumoniae* was present, pigs were vaccinated at three weeks of age with either Hyogen® , a competitor *M. hyo* bacterin or a placebo . Hyogen® vaccinated pigs had statistically significant lower lung scores at slaughter. Hyogen® is both efficacious in the face of *M. hyo* challenge in the field and provides significantly better protection than competitor vaccine[8].

Group Mean Cumulative Lung Scores

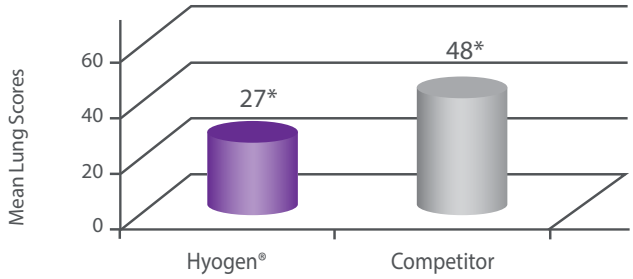


a, A are statistically significant (p=0.00002);
b, B are statistically significant (p<0.005)

Protection of growth

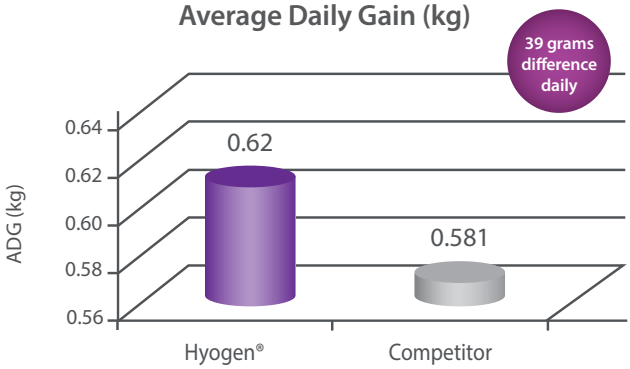
The correlation between the lung lesion scores and growth performance was demonstrated in the field trial where 350 piglets were vaccinated either with Hyogen® or a competitor vaccine at three weeks of age. At slaughter, Hyogen® vaccinated pigs had statistically significant lower lung scores and performed better than the competitor controls[9].

Mean Weighted Lung Scores Per Group

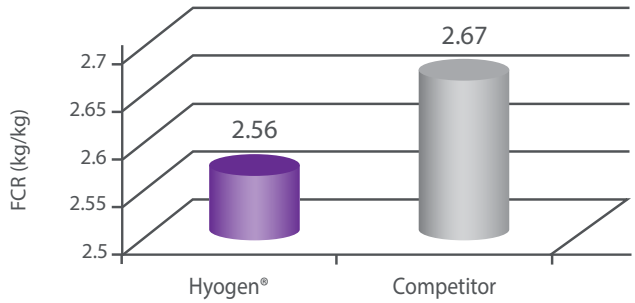


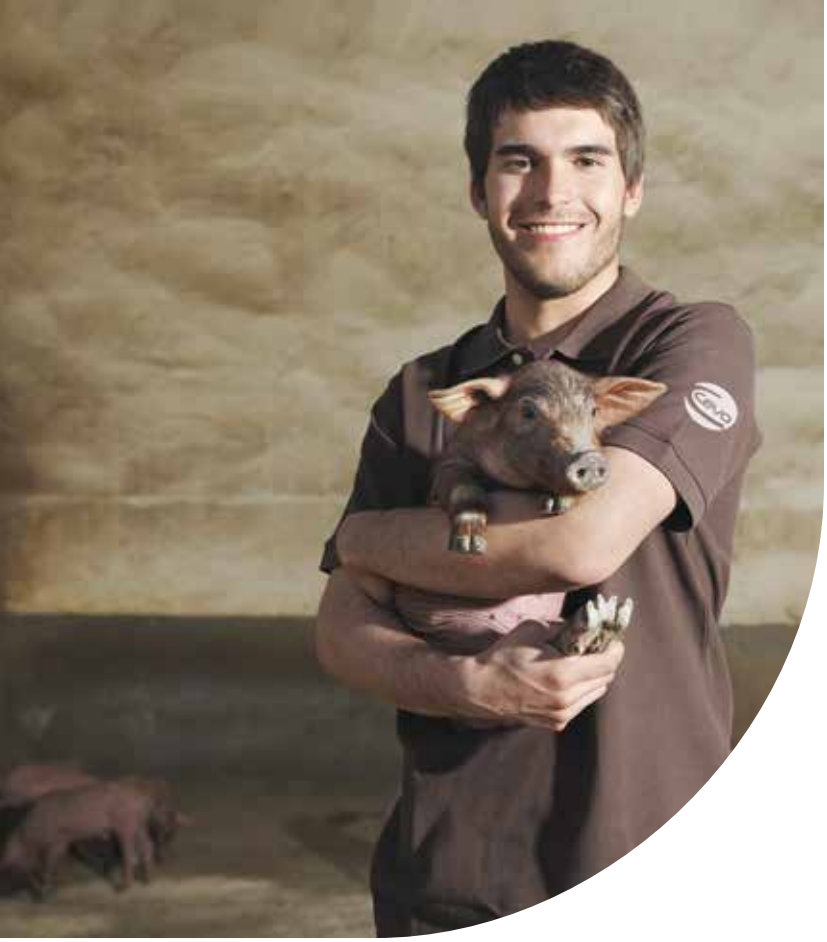
*p = <0,02

Average Daily Gain (kg)



Feed Conversion Ratio





Hyogen® is part of the Ceva Lung Program. The Ceva Lung Program provides an overview of the diseases associated with *Actinobacillus pleuropeumoniae, Mycoplasma hyopneumoniae* and Aujeszky's disease virus.

It offers the methodology and guidelines on how to correctly evaluate the presence, incidence, circulation patterns and impact of these infections using serological investigation and adapted lung scoring of slaughter pigs. It is used to determine the appropriate vaccination protocol and monitor the results of vaccination with Coglapix®, Hyogen® and Auphyl® Plus. Overall, the program is supported by key opinion leaders and is an asset for building Ceva's reputation as experts in respiratory health.

An iPad and Android application to effectively score the lungs at the slaughterhouse.

Hyogen®

WITH Imuvant™

- **Single injection provides early and long lasting protection**
- **Broad stimulation of the immune system with Imuvant™**
- **Trials demonstrate superior protection versus competitor products[8,9]**
- **Expertise of the Ceva Lung Program**

LUNG PROGRAM

Superior Enzootic Pneumonia Protection

Posology and method of administration : Intramuscular route. Administer a single 2 ml dose from 21 days of age. **Withdrawal time :** Zero days. **Special precautions for storage :** The product must be stored between +2 and +8 °C protected from light. Do not freeze.

Fore more details, see the SPC applicable in your country.

1. Straw 1989 / 2. Janeway, et al., Immuno Biology: The immune system in health and disease. 2005 / 3. Park, et al., Nature 453: 1191-1196, 2009 / 4. Lo. D-Y et al., J.Vet.Med.Sci. 71: 897-903, 2009 / 5. Herczeg et al., APVS 2011, « DOI study » / 6. Ceva internal studies / 7. Herczeg et al., APVS 2011, « OOI study » / 8. Herczeg et al., IPVS 2012, p. 178 / 9. Herczeg et al., IPVS 2012, p. 204

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