



Bursine[®]-2



*Fail-Safe IBD Protection
for Over 25 Years*



Leading the Way in IBD Protection

FORT DODGE ANIMAL HEALTH



Bursine[®]-2

A Quarter Century of Fail-Safe IBD Protection

Since 1979, No Surprise. It's Bursine-2 Leading the Way.

The one that can't be beat is the one that can't be replaced. After more than 25 years, Bursine-2, an intermediate infectious bursal disease (IBD) vaccine, continues to reliably perform in the field around the world. The superior performance of Bursine-2 results from its cross-protective nature, safety, speed of replication and ability to protect the immune system.

Today, after billions of doses have been used, Bursine-2 is the time-proven standard. It's recognized. It's established. It's trusted. No other IBD vaccine has been so extensively studied...and proven to be safe and efficacious. When Bursine-2 is the right choice, why would you settle for less?

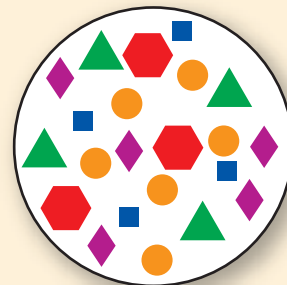
When Is Bursine-2 the Right Choice?

- When the disease challenge requires an intermediate strength vaccine
- When consistent variant protection is required
- When a solid immune system is needed to optimize production

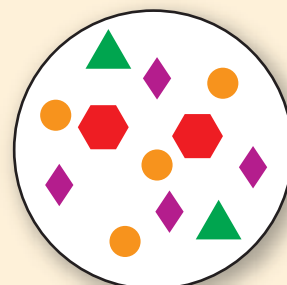
Why Is Bursine-2 the Right Choice?

- It's non-cloned, produced in chicken embryos and the most cross-protective
- It's got the right balance of speed and safety
- It's an intermediate vaccine (Lukert-derived) that is not too mild

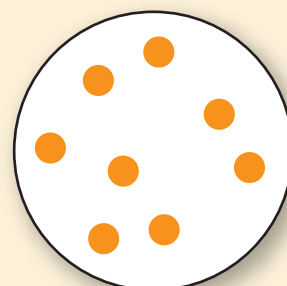
Field vs. Vaccine Virus



Field Virus



Non-cloned Vaccine Virus



Cloned Vaccine Virus

- A field virus theoretically contains a variety of sub-populations that may differ antigenically
- A non-cloned vaccine virus maintains as many of the sub-populations as possible
- A cloned vaccine is developed with the intention of maintaining only a primary sub-population



How Bursine-2 Sets Itself Apart

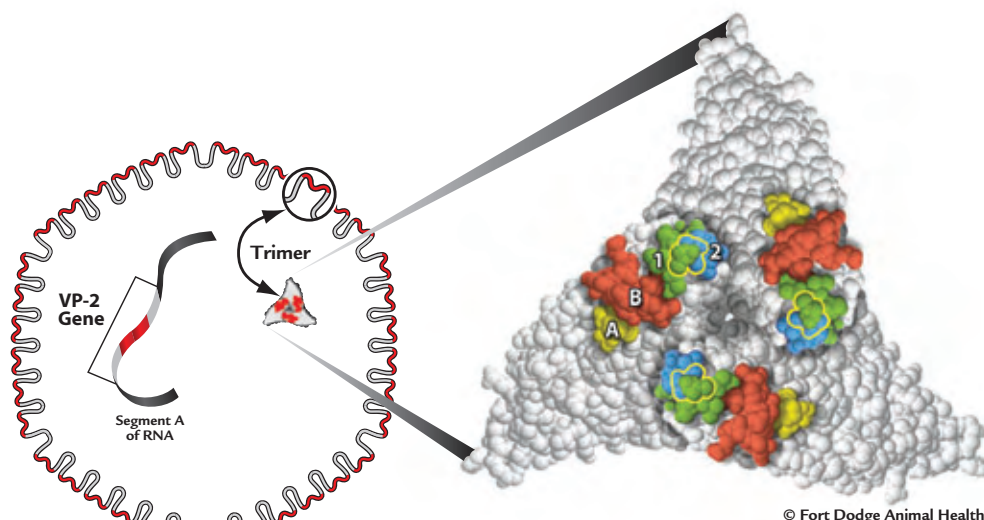
A BETTER ANTIGENIC MATCH FOR VARIANT IBDVS

- Four major clusters of amino acids (hydrophilic peaks) determine the antigenic character of a particular virus
- More antigenic matches (between the vaccine and the field virus) give the vaccine a better chance of protecting in the field
- Bursine-2 is a classic virus matching in the most critical region (Peak B) yet shares key antigenic attributes of variant viruses

	Peak A	Peak 1	Peak 2	Peak B*
Classic Field Virus	■	■	■	■
Vaccines in Molecular Groups 3 & 4	■	■	■	■
Bursine-2	●	●	●	■
Variant Delaware E	●	●	●	●

■ Classic IBDV phenotype expression
 ● Variant IBDV phenotype expression
 * Peak B is the most critical region of antigen expression

- VP-2 gene codes for an amino acid chain, which folds to create three-dimensional structures (VP-2 proteins) that cover IBD virus (Figure 1)
- Three interlocking VP-2 proteins form a VP-2 trimer (Figure 2)
- Central cup-shaped region of trimer functions as a single attachment site (center of Figure 2)
- Amino acids 253 and 284 (outlined in yellow) form a structure that is critical to cell attachment and infection



IBD Virus Cross Section
Figure 1

VP-2 Trimer
Figure 2

© Fort Dodge Animal Health

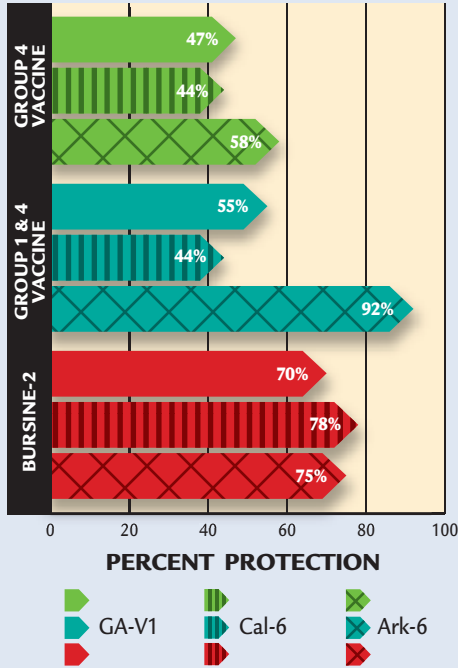
- The four colored structures (A, B, 1 and 2) on each VP-2 molecule represent clusters of amino acids
- These clusters form the 3 peaks of each attachment site (red surfaces of the IBD virus in Figure 1)
- These peaks contain epitopes that make IBDVs antigenically distinct from one another
- Neutralizing antibodies from vaccination bind to these peaks and interfere with infection by field virus



Bursine-2 Provides the Most Consistent Variant Protection

■ Bursine-2 compared to a Group 4 vaccine and a Group 1 & 4 vaccine

Protection Against 3 Variant Viruses (Based on Bursa to Body Weight Ratios)

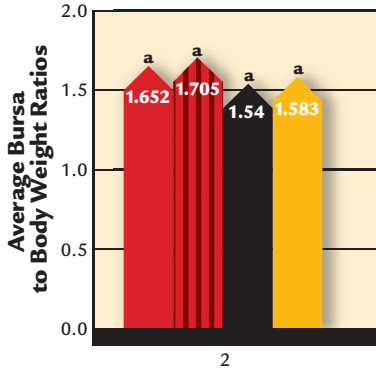


■ Bursine-2 protects against three U.S. variant field strains

Cross Protection Capable

Bursine-2 has been proven to provide broad cross protection against many standard and variant strains around the world.

Challenge Strain	Country of Origin	Virus Type
STC	USA	Standard
IM	USA	Standard
Chilean Isolate	Chile	Standard
Japanese Isolate	Japan	Standard
849VB	Belgium	Standard
6948/V1768	The Netherlands	Standard
CS88	United Kingdom	Standard
Thailand Isolate	Thailand	Standard
CJ801	China	Standard
Delaware A, D, E and G	USA	Variant
Indiana	USA	Variant
U-28	USA	Variant
Mississippi	USA	Variant
California Group 6	USA	Variant
Arkansas Group 6	USA	Variant
Georgia V1	USA	Variant
AL-2	USA	Variant



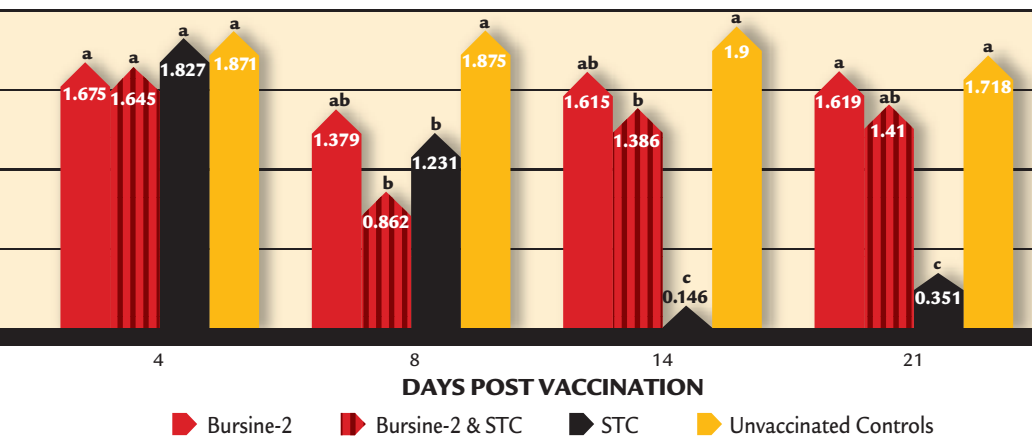


Bursine-2 Blocks Field Challenge Within 24 Hours!

- As soon as 24 hours after vaccination, Bursine-2 hindered replication of the STC challenge virus in a pioneering study¹
- RT-PCR was used to identify Bursine-2 or challenge virus within the bursa

Viruses Present in the Bursa After STC Challenge
(Bursine-2 Given Orally 24 Hours Prior to Oral STC Challenge)

	2 Days	4 Days	8 Days	14 Days	21 Days
Bursine-2	Bursine-2	Bursine-2	Bursine-2	Bursine-2	—
Bursine-2 & STC	Bursine-2	Bursine-2 & STC	Bursine-2 & STC	Bursine-2 & STC	—
STC	—	STC	STC	STC	STC
Negative Control	—	—	—	—	—

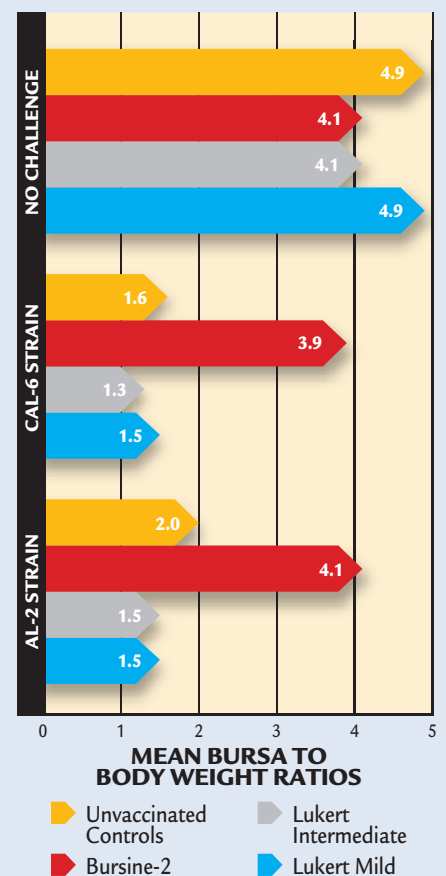


Groups not sharing the same letter are significantly different ($P < 0.05$)

- Bursine-2 significantly limited challenge virus persistence and damage in the bursa
- Recent studies lead researchers to believe this interference may be due to competition at receptor sites

Bursine-2 Protects Faster and Better Than Two Milder Lukert Vaccines

- Bursine-2 was compared to a mild Lukert vaccine and an intermediate Lukert vaccine

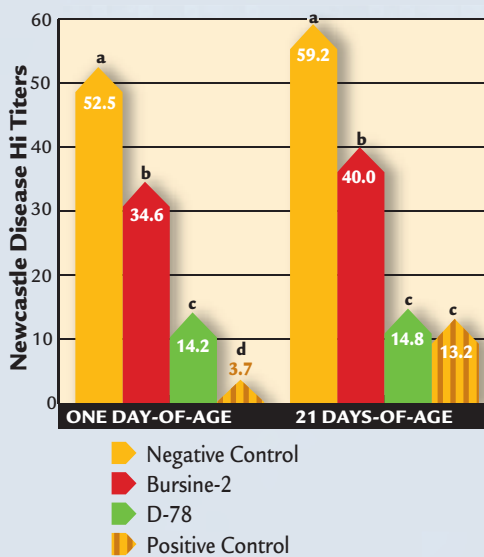


- Bursine-2 provided excellent protection against variant viruses two weeks post-vaccination
- Mild and intermediate competitor Lukert vaccines provided no protection

Proven Bursine-2 Safety in SPF Pullets²

STUDY 1—Bursine-2 Maintains Newcastle Titers

- Newcastle B1 vaccine was given 2 weeks post IBD vaccination
- Serology was evaluated 2 weeks after B1 vaccination

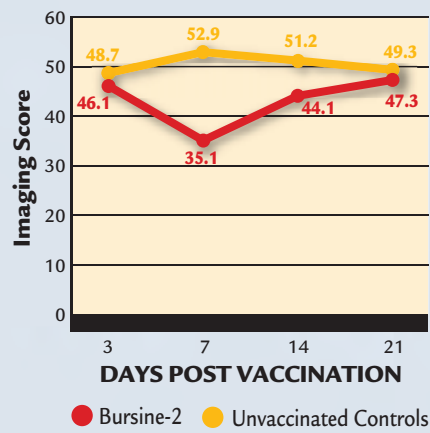


Groups not sharing the same letter are significantly different (P<0.05)

- Bursine-2 showed a much lower suppression of Newcastle immune response compared to D-78 when given at day-of-age or significantly less when given at 3 weeks

STUDY 2—Quick Bursal Regeneration

- Bursine-2 was given at 7 days-of-age
- Vaccine reaction was measured using computer imaging analysis
- Imaging scores represent a percentage of lymphocytes present in the bursa

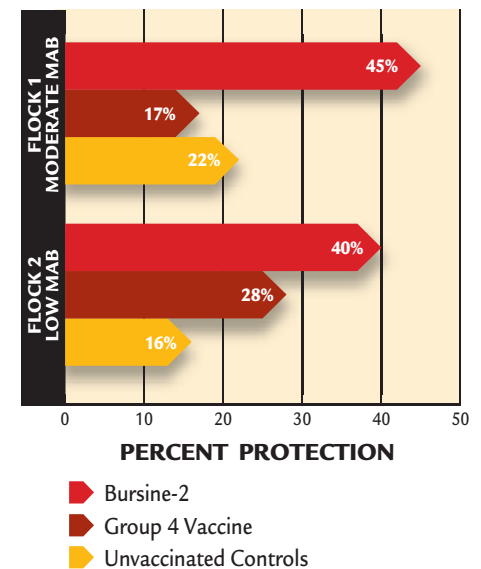


- Bursine-2 reactions peaked 7 days post-vaccination
- There was full regeneration by 21 days post-vaccination

Safety & Efficacy in Commercial Broilers

BURSINE-2 OUTPERFORMS COMPETITOR'S VACCINE IN BROILERS IN A CONTROLLED STUDY

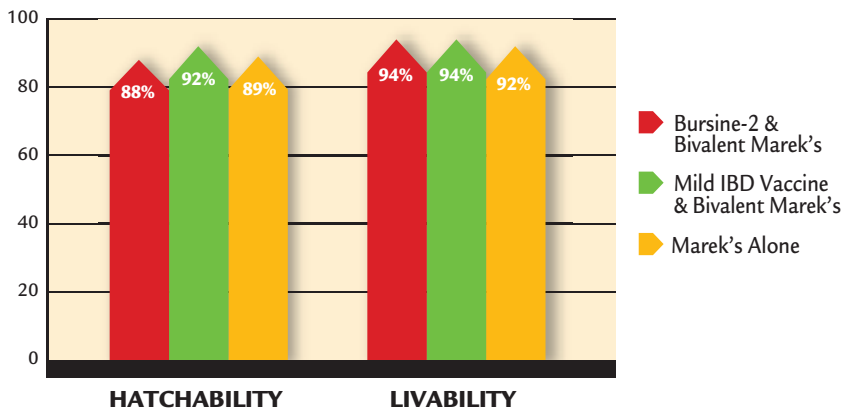
- Maternal antibody (MAB) positive broilers received Bursine-2 or a Group 4 intermediate vaccine at 10 days-of-age and were challenged at 28 days with STC
- Challenge protection determined by gross lesions (bursal edema and hemorrhage)



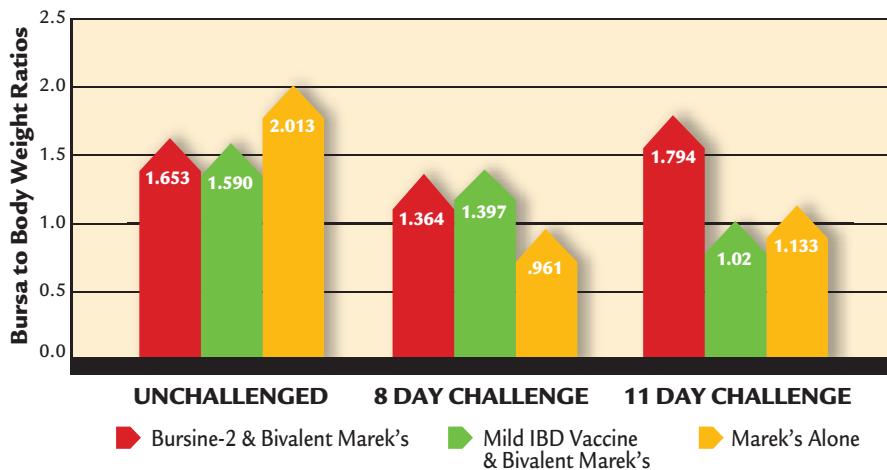
- Several unvaccinated controls still had significant maternal antibody levels that protected them from a 28-day challenge
- Bursine-2 provided significant levels of protection in both flocks
- The Group 4 vaccine immunized a smaller percentage of the low maternal antibody flock

Early Vaccination

- Maternal antibody positive chicks received Bursine-2 or a mild IBD vaccine mixed with a bivalent Marek's vaccine *in ovo*³



- Hatchability and livability were NOT affected by the addition of IBD vaccine to *in ovo* Marek's vaccination



- Bursine-2 combined with bivalent Marek's vaccine caused a mild bursal reaction, yet protected longer (11 days vs. 8 days) than the mild IBD vaccine against Cal-6 variant challenge

Bursine-2 Is Time-tested and Performance-proven Worldwide

Bursine-2 is regarded world-wide as the leading intermediate IBD vaccine. No other IBD vaccine has been tested as extensively nor shown such consistently positive results. Trial-after-trial. Country-after-country. Bursine-2 is in a class of its own. World-class, that is.

REMEMBER WHY BURSINE-2 IS DIFFERENT:

- Superior cross protection
- Fast immune response
- Mild bursal damage
- Rapid bursa regeneration
- Minimal Newcastle titer suppression
- Safe, even in SPF pullets
- Effective in presence of maternal antibodies
- Flexible vaccination programming options

1. Ashraf, S., G. Abdel-Alim, M.Q. Al-Natour and Y.M. Saif. Interference Between Mild and Pathogenic Strains of Infectious Bursal Disease Virus in Chickens. Avian Diseases 49:99-103, 2005.
 2. Mazariegos, L.A., P.D. Lukert and John Brown. Pathogenicity and Immunosuppressive Properties of Infectious Bursal Disease "Intermediate" Strains. Avian Diseases 34:203-208, 1990.
 3. Cookson, K., Joe Giambrone and Jeff Rodenberg. Infectious Bursal Disease Virus Protection in Commercial Broilers Vaccinated with Marek's Disease Vaccine +/- IBD Vaccine. Proceedings of the Fifty-Second Western Poultry Disease Conference, Sacramento, CA. pp. 43-44. 2003.

Leading the Way...

The leader is the one customers prefer by choice. They prefer quality, achievement, innovation and performance. They prefer the one they can trust. This is why Fort Dodge Animal Health has become one of the leading manufacturers of veterinary vaccines in the world—and a leading vaccine producer for the poultry industry.

Leading the Way Requires Technical Support to Provide Local Solutions to a Global Problem

- **Disease Expertise.** Poultry producers have a scientific partner to research and understand how IBD reduces performance.
- **Virus Knowledge.** Fort Dodge Animal Health's know-how and expertise helps provide local solutions to prevent potential IBD losses.
- **Educational Support.** Producers have always been able to rely on Fort Dodge Animal Health for the latest scientific information on IBD.

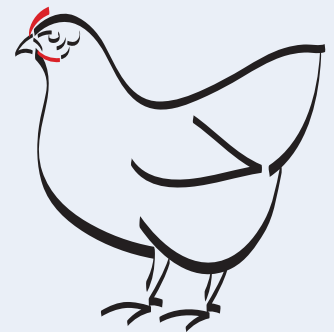
Leading the Way Requires Precise Diagnostic Support

- **Start with the Bursameter.** This simple, effective tool allows for quick, accurate and objective evaluation of bursal health.
- **Add Computer Imaging Analysis.** For many years, Fort Dodge Animal Health has used this innovative technology to quantify bursal damage and estimate time of infection.
- **Complement with Molecular Diagnostics.** Polymerase Chain Reaction (PCR) is followed by either Restriction Fragment Length Polymorphism (RFLP) or sequencing analysis. These state-of-the-art tools identify and characterize IBD strains around the world.

Leading the Way Requires a Solid Reputation

- **Quality, Time-tested Products.** Bursine®-2, Bursine® Plus and Poulvac® Bursa F vaccines provide maximum flexibility in vaccination programming... whatever the local IBD challenge. All products are tested and meet global guidelines for purity, potency, safety and efficacy.
- **People and Service.** Experts in IBD around the world ensure the right IBD program provides a local solution to allow customers to maximize profits. And our IBD experts are backed by professionals ensuring timely delivery and product support.
- **Dedication to the Industry.** Few companies can compare to our nearly 100-year dedication to the global animal health industry. Over those years, Fort Dodge Animal Health's commitment to the global poultry industry has helped producers worldwide to maximize profits through improved disease control.
- **Constant Innovation.** Fort Dodge Animal Health uses the latest scientific information and technology to develop the products and applications required to control the evolving IBD challenge around the world.

Fort Dodge Animal Health... A Company that Leads the Way—Isn't that What You'd Prefer?



Protection for Productivity

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