



Bursine® Plus

*Solid, Powerful
IBD Protection*



Leading the Way in IBD Protection

FORT DODGE ANIMAL HEALTH



Bursine® Plus

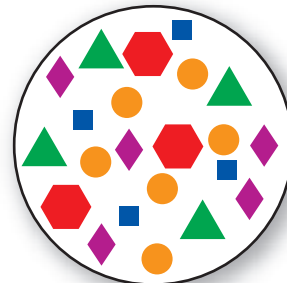
Protecting Against More Severe IBD Challenge

IBD field challenges are dynamic. Based on management practices, environment, breed, etc., an IBD challenge may change from region-to-region, farm-to-farm and flock-to-flock. When an IBD challenge becomes more robust, mild or intermediate IBD vaccines may no longer protect the birds and performance. In those situations, Bursine Plus, an intermediate-plus vaccine, is an excellent option. Bursine Plus solidly protects against more aggressive IBD challenges.

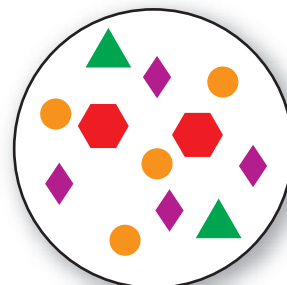
Bursine Plus – The Problem Solver

- Non-cloned
- Produced in chicken embryos
- Excellent variant cross protection
- Safe and effective in the presence of high maternal antibodies

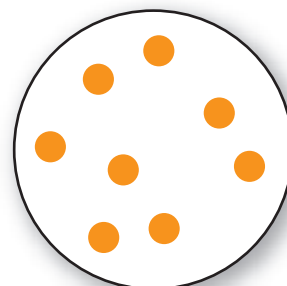
Field vs. Vaccine Virus



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



Bursine Plus Has the Right Balance

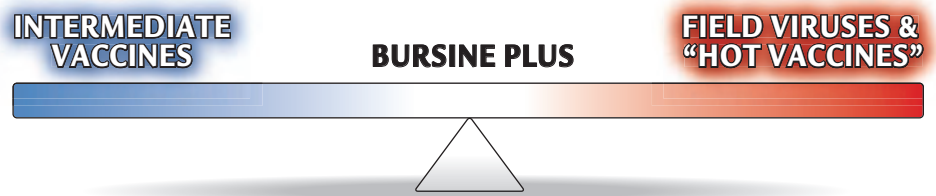
Fort Dodge Animal Health researchers developed Bursine Plus to be a truly intermediate-plus vaccine by adapting the proven Bursine®-2 strain in chickens. The result—Bursine Plus is balanced between the more attenuated intermediate vaccines and the more pathogenic field viruses or “hot” vaccines.

When to Use Bursine Plus

- Reduce or “cool” a resident IBD challenge
- Prepare for seasonal changes that increase disease challenge
- Problem farms where milder vaccines are inadequate
- Before rotation onto a coccidiosis vaccine or other known stressor

Aspects of Balancing Efficacy & Safety of IBD Vaccines

- Milder vaccines are “gentle” on the bursa but don’t evoke as strong an immune response
- Many “intermediate plus” vaccines, while effective in a high challenge situation, may cause excessive damage to the bursa
- In some situations, production parameters may be negatively affected with these vaccines



- Bursine Plus master seed contains critical molecular characteristics allowing it to replicate faster than intermediate products.
- Bursine Plus is truly intermediate-plus strength as it creates a robust reaction in the bursa followed by significant regeneration.
- Bursine Plus contends with the most aggressive field viruses without causing significant immune suppression.



Amino Acid Sequencing Confirms the Unique Molecular Characteristics of Bursine Plus

ENHANCED ACTIVITY LEVEL

- A vaccine's activity level determines its ability to establish itself in the bursa and quickly replicate and immunize in the presence of maternal antibodies
- Tissue-culture adapted viruses have two amino acid changes (253 and 284, see chart below) that enable them to grow more efficiently in cell culture and less efficiently in bursas
- Bursine Plus retains a key amino acid (253) that is found in wild viruses and is essential for optimal activity in the bursa ("take" or infection)

	Position 253	Position 284
Classic Field Strains	✓	✓
Variant Field Strains	✓	✓
Bursine Plus	✓	◆
Tissue Culture Adapted Vaccines	◆	◆

✓ = Most efficient bursal activity level

◆ = Less efficient bursal activity level

Better Antigenic Match for Variant IBDVs

- Four major clusters of amino acids (hydrophilic peaks) determine the antigenic character of a particular virus
- The more antigenic matches between the vaccine strain and the field virus, the better chance a vaccine has of protecting in the field
- Bursine Plus is a classic virus, yet shares some key antigenic attributes of variant viruses in all four important antigenic peaks

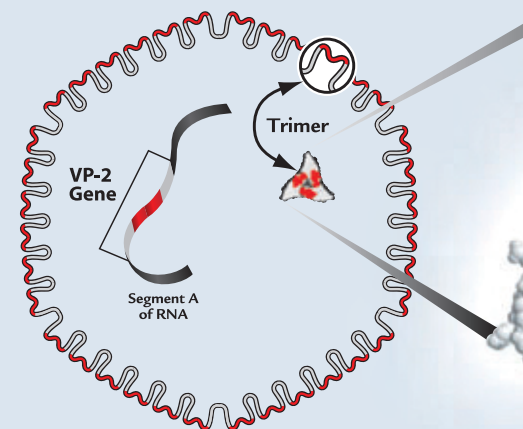
	Peak A	Peak 1	Peak 2	Peak B*
Classic Field Virus	■	■	■	■
Vaccines in Molecular Groups 3 & 4	■	■	■	■
Bursine Plus	●	●	●	▲
Variant Delaware E	●	●	●	●

■ Classic IBDV phenotype expression

● Common variant IBDV phenotype expression

▲ Unique IBDV phenotype expression

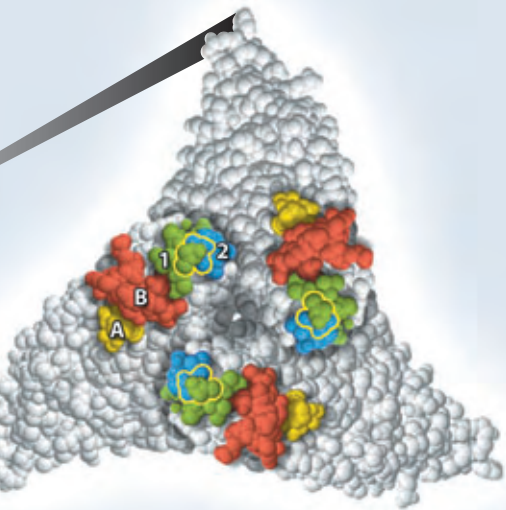
* Peak B is the most critical region of antigen expression



IBD Virus Cross Section
Figure 1

- 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





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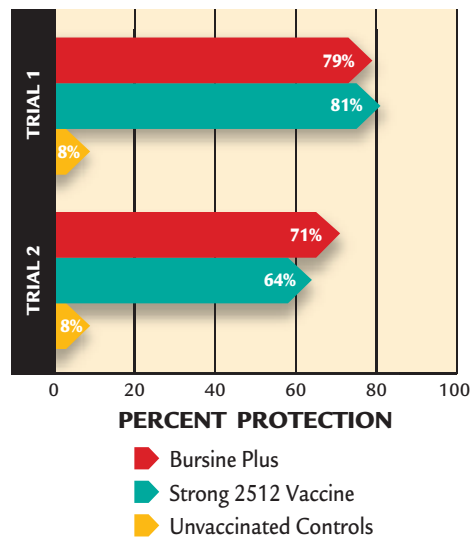
**VP-2 Trimer
Figure 2**

- 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



POWERFUL COMMERCIAL BROILER PROTECTION

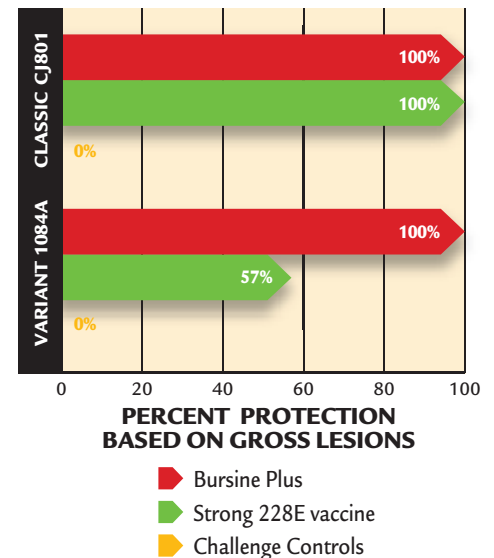
- Bursine Plus protection was compared to a strong 2512 vaccine (Molecular Group 3) in maternal antibody positive birds
- Commercial broilers were vaccinated at 14 days-of-age and challenged at 28 days with the STC virus



- Bursine Plus protected well in the presence of maternal antibodies

BURSINE PLUS OFFERS BETTER VARIANT CROSS-PROTECTION THAN A STRONG 228E VACCINE AGAINST VARIANT 1084A

- SPF chickens were vaccinated at 7-days-of-age¹
- Birds were challenged at 28 days with either classic strain CJ801 or Delaware variant strain 1084A



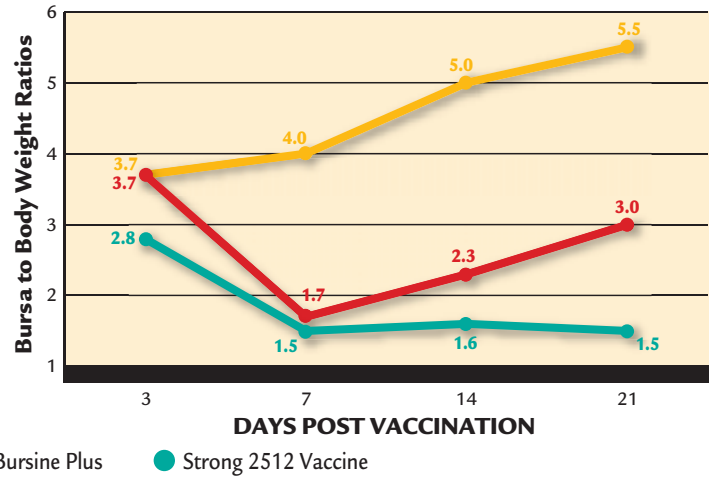
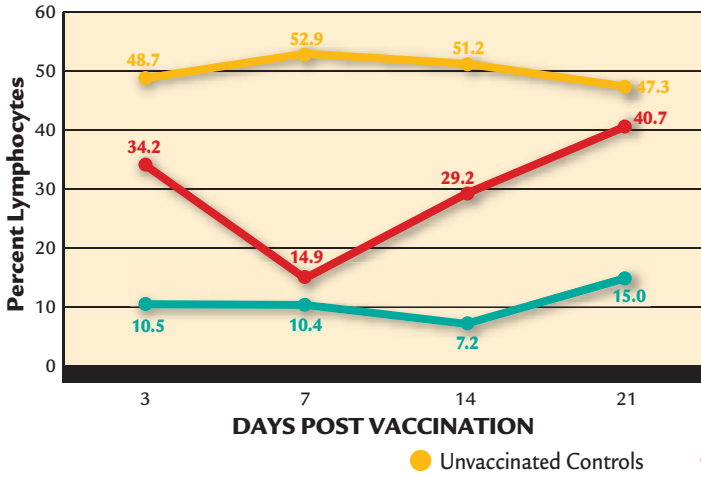
- Bursine Plus gave 100% protection against both the classic and variant challenge viruses
- Strong 228E vaccine gave solid protection against only the classic virus



Bursine Plus – A Robust Take With Greater Bursal Regeneration

BURSINE PLUS – BETTER REGENERATION THAN A STRONG 2512 VACCINE

- Seven-day-old SPF leghorn pullets were vaccinated with Bursine Plus or a strong 2512 vaccine and bursas were evaluated for three weeks



- Bursine Plus established a quick infection after vaccination, fast regeneration and did NOT cause permanent bursal damage
- The strong 2512 vaccine caused greater bursal damage and there was little bursal regeneration

BURSINE PLUS STUDY SHOWS FAST REGENERATION

- SPF chickens were vaccinated at 7-days-of-age and bursas were evaluated 10 and 14 days post-vaccination¹

	Bursa to Body Weight Ratios		Lymphocyte Depletion	
	5 days	10 days	10 days	14 days
Bursine Plus	3.38 ^b	3.32 ^b	50%	25%
Strong 228E Vaccine	2.90 ^b	2.45 ^b	50%	50%
Unvaccinated Controls	5.40 ^a	5.94 ^a	0%	0%

Different superscripts indicate significant differences P<0.05

- Bursine Plus produced a rapid bursal infection followed shortly by significant regeneration of the lymphocytes
- The strong 228E vaccine showed no bursal regeneration during the study



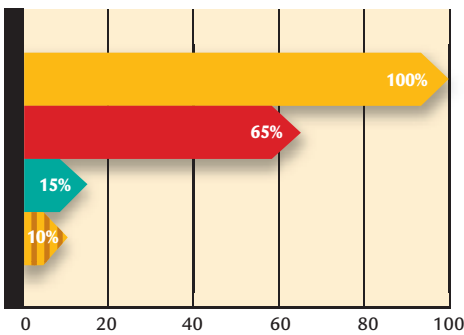


Powerful Protection Without Immune Suppression

- IBD protection helps ensure a solid immune response to the rest of the vaccination program and to protect total flock performance
- Newcastle titer response is used to evaluate the effect of IBD vaccine on the immune system

BURSINE PLUS – LESS IMMUNOSUPPRESSIVE THAN A STRONG 2512 VACCINE

- SPF leghorns were vaccinated with IBD vaccine at 7 days-of-age and with Newcastle B₁ vaccine at 14 days
- At 42 days-of-age, Newcastle disease (ND) HI titers were evaluated



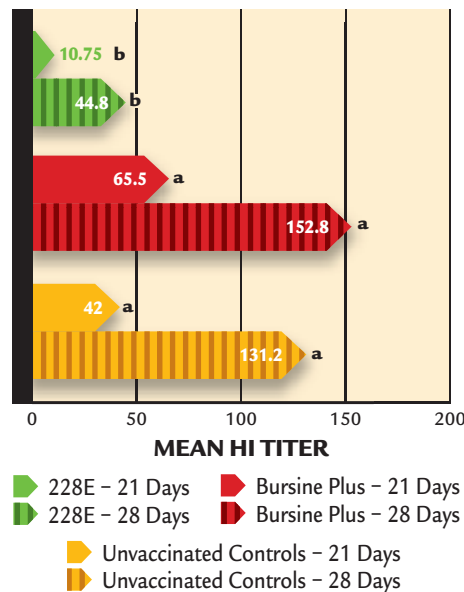
TITER RESPONSE AS A % OF CONTROLS

- ND Vaccine Alone
- Bursine Plus & ND Vaccine
- 2512 & ND Vaccine
- No ND Vaccine

- Bursine Plus vaccinates produced higher Newcastle vaccine titers than a strong 2512 vaccine

BURSINE PLUS - LESS IMMUNOSUPPRESSIVE THAN A STRONG 228E VACCINE

- SPF leghorns were vaccinated with IBD vaccine at 7 days-of-age and with Ulster strain Newcastle vaccine at 14 days¹
- At 21 and 28 days-of-age, Newcastle disease (ND) HI titers were evaluated



Different letters indicate significant differences $p < 0.05$

- Bursine Plus did not affect Newcastle vaccine response
- The strong 228E vaccination resulted in depression of the Newcastle vaccine response

Bursine Plus—Powerful Protection Against Strong IBD Challenges

- Immunizes well in the presence of maternal antibodies
- Cross protective against variant viruses
- Gentler on the bursa than competitive vaccines

1. Zhou, J., J. Liu, Y. Liu and Y. Cao. Comparative Studies of the Immunized Efficacy between Bivalent Live IBD Vaccine and Three Commercial Live Vaccines. Chinese Journal of Veterinary Medicine. pp 38-40, 1998.

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.

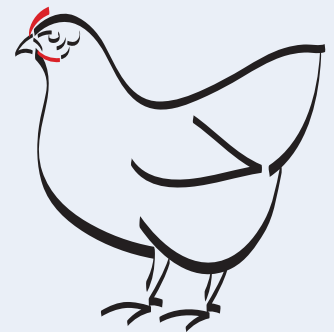
Leading the Way Requires Precise Diagnostic Support

- **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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