

Broad-spectrum respiratory protection

Arsenal® 4.1 provides proven respiratory protection against:

- BVD Types 1 & 2 – including the real-world threat, noncytopathic (NCP) BVD
- BRSV
- IBR
- PI₃

Tough challenge models prove performance

The efficacy of Arsenal 4.1 has been proven in advanced challenge models, with viral challenge levels likely higher than what your herd encounters.

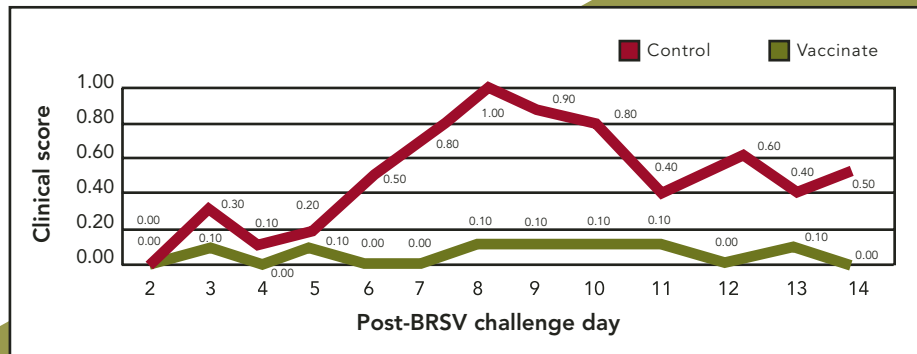
Arsenal 4.1 withstood a “killer” BVD Type 2 challenge – no signs of sickness in vaccinated calves in trial tough enough to kill 25% of the non-vaccinates.

Number of animals/total			
	Vaccinate	Control	P value*
Temp ($\geq 103.5^{\circ}\text{F}$)	0/20	9/12	<0.0001
Clinical Signs	0/20	12/12	<0.0001
Mortality	0/20	3/12	0.0444
Leukopenia (Drop in white blood cells)	1/20	10/12	<0.0001
Virus shedding	0/20	7/12	0.0002

*A p value ≤ 0.05 is considered statistically significant.

Arsenal 4.1 is effective against a BRSV challenge – with one SubQ dose (Figure 1).

Figure 1. Average daily total clinical score*



* The clinical scoring system included nasal discharge, respiratory signs and ocular signs.

Little effect on milk production

A field trial compared the effect of sterile water and two commercially available modified live virus vaccines – Arsenal 4.1 and Bovi-Shield® GOLD 5™ – on milk production.

Protocol:

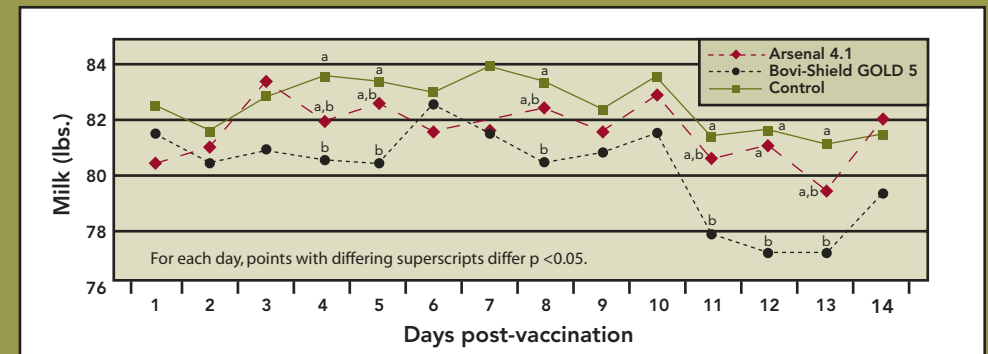
- 259 Holstein cows vaccinated according to label directions
- 86 in Arsenal 4.1 group, 87 in Bovi-Shield GOLD 5 group, 86 in control group (2-mL sterile saline SubQ)
- Animals were open, 40 to 357 days in milk and in good health
- Daily milk production recorded for each animal, five days prior to vaccination and 14 days after vaccination

Milk production by treatment group for the 14-day post-vaccination period is illustrated in Figure 2.

There was no significant difference between Arsenal 4.1 vaccinates and the control cows. The lower milk production for the Bovi-Shield GOLD 5 vaccinates vs. controls was statistically significant.



Figure 2. Least squares means daily milk production post-vaccination



Arsenal is a registered trademark of Novartis AG. Bovi-Shield is a registered trademark of Pfizer Animal Health. Bovi-Shield GOLD is a trademark of Pfizer Animal Health.

Study didn't cause calves to sweat

A study involving steers and heifers – ranging in age from six to eight months and weighing about 500 pounds each – showed no significant difference in body temperature between vaccinated and control animals.

Calves did not develop fevers within 72 hours after vaccination with Arsenal 4.1.

Average temperature response

	Controls (no vaccinations)	Arsenal 4.1 vaccinates
	Mean rectal temperature (°F)	
Number of animals	10	30
Pre-vaccination	101.4	101.7
24 hours post-vaccination	101.2	101.5
48 hours post-vaccination	101.0	101.2
72 hours post-vaccination	101.2	101.3

Temperature differences: CP vs. NCP?

The reason Arsenal 4.1 did not cause calves to sweat may be related in part to its noncytopathic (NCP) BVD strain. Arsenal 4.1 contains NCP Type 1 BVD, while most other modified live virus products contain CP (cytopathic) Type 1 BVD.

Research demonstrates that the bovine immune system responds differently to NCP and CP biotypes:

- NCP strains produce a significantly higher, more rapid antibody response than CP¹
- The NCP biotype has a greater protective effect on viremia²

The NCP biotype is:

- The most predominant BVD virus found in cattle³
- The leading cause of BVD-linked respiratory disease in calves⁴
- The sole cause of persistently-infected calves that develop *in utero* during the first 40-120 days of gestation
- Included in Arsenal 4.1

1. Lambot M, et al. *J Gen Virol.* 1997;78:1041-1047.

2. Lambot M, et al. *J Gen Virol.* 1998; 79:27-30.

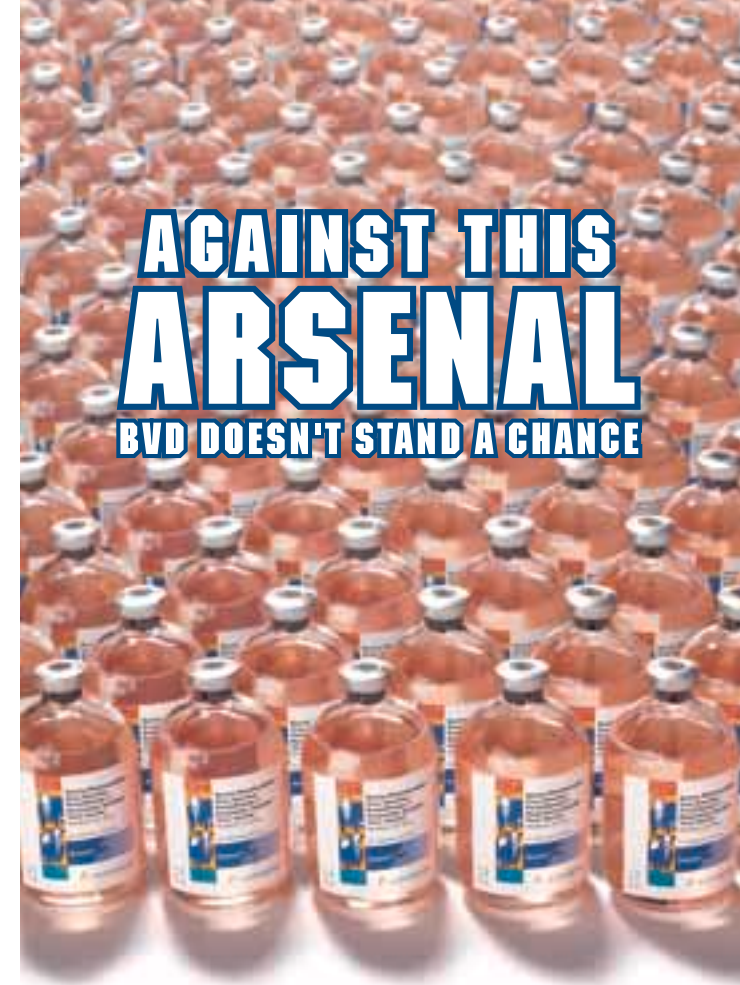
3. Bolin SR, Grooms DL. *Vet Clin North Am Food Animal Pract.* 2004;20:51-68.

4. Fulton RW. *Can J Vet Res.* 2002;66:181-190.



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ARSENAL® 4.1 SOUND SCIENCE. PROVEN PERFORMANCE.

- Broad-spectrum respiratory protection
- One-dose SubQ administration
- Responds to emerging threats – noncytopathic BVD
- Proven in tough challenge models
- Smoother, so fewer vaccination setbacks

