

ENDOVAC-Bovi® in Lactating Dairy in Cows

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Dr. David Hutcheson, Animal Nutritionist and Bovine Consultant, Animal Agricultural Consulting, Inc., P.O. Box 50367, Amarillo, TX 79159

Objective

Evaluate the effects of four bacterins' administration on daily milk production, dry matter intake and somatic cell counts.

Introduction

Mastitis occurs in 10% to 12% of all lactating cows in the United States, with 30% to 40% of mastitis cows have inflammation due to *Escherichia coli*. Mastitis costs U.S. dairy producers more than \$1 billion annually. Diminished milk production, discarded milk, the need for replacement cows, the decreased sale value of cows, cost of drugs, veterinary services, and additional labor all contribute to the economic losses.

Endotoxemia results from the release of endotoxins through the death of Gram-negative bacteria, such as *E. coli*. This occurs during phagocytosis by udder leukocytes or by the action of antimicrobials used in treatment. The clinical signs of coliform mastitis include serous secretion in the affected quarter or quarters, pyrexia, depression, anorexia, swelling and firmness of the affected quarter or quarters, ruminal hypomotility, muscle fasciculations, cold skin temperature, and diarrhea--all signs of endotoxemia.

Traditionally, treatment of coliform mastitis has been initiated only after the development of clinical illness. Therapy has been met with varying success.

The chief disadvantage of treatment initiated after clinical illness has developed is that the disease has frequently advanced to an irreversible state. Moreover, this treatment requires withholding the cow's milk from market for days to weeks, depending on the type and amount of drug used to counter the infection. And even with successful treatment, only 20% of mastitis cows ever return to normal production; most are culled for agalactia. Also of recent concern is the development of drug-resistant salmonellae with the potential for entry into the food chain. Two methods are currently available for decreasing the prevalence of coliform mastitis. First, better management of bedding and teat sanitation techniques decreases the exposure of teat ends to bacteria. Second, vaccination enhances the cow's immunologic resistance to environmental bacteria.

Previously, vaccines were limited to three types: autogenous bacterial isolates expressing various specific antigens (K antigens or O-carbohydrate side chains), live vaccines composed of attenuated or deletion-modified bacteria, and polyvalent vaccines composed of the serotypes sometimes associated with mastitis.

Cross-protective vaccines have been manufactured using genetically engineered mutants such as the patented R/17 strain of *Salmonella typhimurium* and the J-5 strain of *E. coli*. A combination vaccine, ENDOVAC-Bovi® (IMMVAC), manufactured with the R/17 mutant and

combined with an immune-potentiating adjuvant (**IMMUNEPlus®**), significantly reduces the devastating diseases caused by Gram-negative bacteria producing various endotoxins.

The use of ENDOVAC-Bovi® is the only core-antigen vaccine with a unique and effective immune stimulant. The patented **IMMNEPlus®** in combination with the mutant Re-17 bacterin protects against *E. coli* Mastitis and other endotoxin-mediated diseases caused by *E. coli*, *Salmonella*, *Pasteurella multocida*, and *Pasteurella (mannheimia) hemolytica*.

Procedures

Mature dairy cows at least 60 days in milk were indentified and allotted to 4 milking groups. The four groups were randomly allotted to the bacterins:

1. ENDOVAC-Bovi®
2. J-5
3. J-Vac
4. Negative Controls

Cows were randomly allotted to the treatment groups by the last 2 digits of the cows ear tags number. Three hundred and fourteen cows were allotted to four treatment groups of 80 (ENDOVAC-Bovi®), 78 (J-5), 79 (J-Vac) and 77 (Negative Control) cows per group. The cows were penned in separate pens by treatment groups. The cows were fed from 1 to 26 days with the same ration to all treatment groups. The ration fed was the standard ration being fed at the dairy for milking cows. The treatments were administered on day 8 by manufactures label dose for all treatments. The treatments were administered as shown in Table 1.

Table 1 Treatments and Mode of Administration

Treatment	Vaccine	Administration
1	ENDOVAC-Bovi®	2cc (IM)
2	J-5	5cc (SC)
3	J-Vac	2cc (IM)
4	Negative Control	None

Daily milk records and dry matter feed records were collected from each cow during the 26 day experimental period and somatic cell counts (SCC).

Results and Discussion

Table 2 shows the means and standard deviations for dry matter consumption by treatments and pre and post vaccination. There were no significant differences in dry matter consumption among the treatments either pre to or post vaccination.

Table 2. Dry matter consumption, Pre and Post Vaccination

Treatments	ENDOVAC-Bovi®	J-5	J-Vac	Negative Control	P value
Pre to Vaccination (7 days)					
Mean	58.2	56.2	58.5	57.1	0.34
STD	2.8	1.9	3.4	1.8	
Post Vaccination (19 days)					
Mean	59.3	59.3	60.1	58.5	0.50
STD	2.5	3.3	3.8	2.7	

Milk production was significantly higher for the cows to be administered J-5 and negative control pre test, Table 3. However no differences in milk production were detected after vaccination for any treatments.

Table 3. Milk Production, Pre and Post Vaccination.

Treatments	ENDOVAC-Bovi®	J-5	J-Vac	Negative Control	P value
Pre to Vaccination (7 days)					
Mean	98.9 ^b	101.2 ^a	98.9 ^b	100.5 ^a	0.01
STD	1.7	1.3	1.2	1.0	
Post Vaccination (19 days)					
Mean	99.6	100.6	99.9	100.1	0.62
STD	1.9	2.2	2.5	1.8	

Somatic Cell Counts were significantly higher for the group to be administered ENDOVAC-Bovi® than the J-Vac group pre vaccination. The J-5 was the lowest SCC but was not different from J-5 and Negative control pre vaccination. After vaccination the ENDOVAC-Bovi® group was significantly lower than other vaccination groups or negative control (Table 4). The ENDOVAC-Bovi® group proved to be the most effective control of mastitis as measured by SCC.

Table 4. Somatic Cell Counts (SCC), Pre and Post Vaccination.

Treatments	ENDOVAC-Bovi®	J-5	J-Vac	Negative Control	P value
Pre to Vaccination (7 days)					
Mean	121.1 ^a	94.9 ^{a,b}	64.5 ^b	89.4 ^{a,b}	0.03
STD	48.3	41.4	10.4	9.2	
Post Vaccination (19 days)					
Mean	81.8 ^a	126.3 ^b	118.7 ^b	136.0 ^b	0.01
STD	25.2	44.7	35.2	40.03	

Conclusions

- ENDOVAC-Bovi® significantly lower somatic cell counts thereby decreasing mastitis in lactating dairy cow.
- ENDOVAC-Bovi® had no effect on milk production in lactating dairy cows.
- ENDOVAC-Bovi® had no effect on dry matter intake in the lactating dairy cow.