

Bovatec[®] Improves Cattle Performance Regardless of Pasture Type or Supplement Delivery Method

Abstract

A summary of published research studies was compiled to evaluate the impact of forage type and supplement delivery method on cattle response to Bovatec (lasalocid) supplementation. Fifty-eight research studies were compiled that included 84 comparisons of a supplement medicated with Bovatec and the same supplement without Bovatec. Of the 84 comparisons, 77 included pasture descriptions that were used to group pastures into one of four categories, cool season, warm season, mixed season, and winter annuals. To be included in the summary, a study needed to contain a comparison between a non-medicated control supplement and the same supplement medicated with Bovatec. Replication of treatments and randomization of cattle to pastures and pastures to treatments were also requirements for inclusion in the database. Response to Bovatec within each pasture type was evaluated. When Bovatec was supplemented to cattle grazing warm- or cool-season grasses, daily weight gain was improved by 0.14 or 0.15 lb/hd/d, respectively. Cattle grazing mixed-season grasses supplemented with Bovatec gained 0.10 lb/d more than cattle not receiving Bovatec. The greatest response to Bovatec supplementation occurred when cattle were grazing winter-annual pastures (0.20 lb/hd/d). Comparisons of hand-fed vs self-fed supplement delivery methods resulted in numerically identical improvements in ADG from Bovatec. However, feeding supplements on a free-choice basis may result in a more variable response to Bovatec supplementation. Bovatec improves cattle performance across a wide variety of pasture types while maintaining supplement intake at safe levels formulated to eliminate nutrient deficiencies.

Introduction

Supplementation programs to prevent energy, protein, vitamin, and mineral deficiencies (arising from inadequate forage and nutrient intake, changing forage quality, and

changing forage availability) are commonly employed to maintain cattle performance and profitability. Pasture and range conditions where cattle graze vary widely across regions of the country and seasons of the year, making diet formulation needed to maintain cattle performance and profitability challenging. Bovatec, incorporated into various supplements, enhances ruminal fermentation, promoting more efficient utilization of forages, subsequently improving growth rate and animal productivity from pasture. Bovatec is used to enhance performance of cattle grazing the diverse forage types and qualities encountered across North and South America, Australia, and other areas of the world where cattle utilize grass resources. Research has also indicated that Bovatec can have beneficial effects in promoting health of grazing cattle by reducing incidence and severity of coccidiosis and other health-related problems. The effects of supplementation programs and forage types on feed additive responses are important considerations when selecting an appropriate additive for one's pasture types and conditions.

The objective of this Technical Bulletin was to evaluate the impact of forage types and supplement delivery method on grazing cattle responses to Bovatec.

Summary of the Experiments

A data set of research experiments was compiled from: Alpha archives; state beef cattle reports; and peer-reviewed articles that compared performance of grazing cattle consuming supplements with and without Bovatec. The data includes 58 research studies with 84 comparisons of Bovatec and an appropriate supplemented non-medicated control group. Research studies included in the data set were replicated with cattle randomly assigned to pasture and pastures assigned to treatment. In addition,

supplements used within each experiment needed to be identical across treatments, with the exception of Bovatec inclusion. Research observations were grouped based on forage type (cool season, warm season, mixed season, and winter annual) so that the effects of forage type on cattle response to Bovatec could be evaluated. Data were further grouped within forage type based on supplement delivery method so that the effect of delivery method on cattle response to Bovatec could be evaluated.

The data set included: 19 observations with cool-season grasses; 16 with warm-season grasses; 25 with mixed-season or a mix of grasses and legumes; and 17 with winter annuals (Table 1). Mixed-season pastures were primarily a combination of cool-season grass (predominately fescue, and clover or alfalfa). Most of the winter-annual observations were wheat pasture, but also included rye and oat pastures.

Bovatec consumption was within the approved range of 60 to 300 mg/hd/d with 100 mg/hd/d being the lowest dose evaluated in any of the studies (Table 1). The mean Bovatec intake approached the optimal dose of 200 mg/hd/d across forage types. Mean initial cattle weight varied by approximately 80 lb with a high of 587 lb for mixed-season observations and a low of 502 lb for winter annuals. Mean study length for forage types was approximately 100 days with a range of 97 to 108.

Supplements were hand-fed or self-fed, with most hand-fed supplements consisting of 1 to 3 pounds of ground corn. Most self-fed supplements consisted of loose minerals with cattle consuming 2 to 4 oz/hd/d. Hand-fed supplements appeared to be designed as carriers for Bovatec rather than a source of significant supplemental nutrients (with the possible exception of energy). Supplements fed to cattle grazing cool-season and winter-annual pastures were hand-fed (an exception was 1 cool-season observation). Energy supplementation with cool-season grasses and winter annuals would be expected to have less of a detrimental effect on forage intake and digestibility than when the same supplement was fed to cattle grazing warm-season or perhaps mixed-season grasses.

To evaluate treatment means within the database, an F-test for equal variance was conducted. Within the database, across study means, the assumption of equal vari-

TABLE 1. Bovatec database-summary of experimental information by grass type.

Cool-season observations, # (% of total)	19 (24.7%)
Avg. Bovatec dose, mg/hd/d (\pm std dev)	179 (\pm 62.9)
Range in Bovatec dose, mg/hd/d	100 to 300
Avg. initial weight, lb (\pm std dev)	554.9 (\pm 151.9)
Avg. duration of studies, days (\pm std dev)	107.8 (\pm 17.6)
Warm-season observations, # (% of total)	16 (20.8%)
Avg. Bovatec dose, mg/hd/d (\pm std dev)	158 (\pm 47.1)
Range in Bovatec dose, mg/hd/d	100 to 252
Avg. initial weight, lb (\pm std dev)	513.9 (\pm 155.8)
Avg. duration of studies, days (\pm std dev)	97 (\pm 14.6)
Mixed-season observations, # (% of total)	25 (32.5%)
Avg. Bovatec dose, mg/hd/d (\pm std dev)	183 (\pm 59.8)
Range in Bovatec dose, mg/hd/d	100 to 300
Avg. initial weight, lb (\pm std dev)	587.5 (\pm 93.8)
Avg. duration of studies, days (\pm std dev)	108 (\pm 19.6)
Winter-annual observations, # (% of total)	17 (22.1%)
Avg. Bovatec dose, mg/hd/d (\pm std dev)	173.5 (\pm 56.2)
Range in Bovatec dose, mg/hd/d	100 to 300
Avg. initial weight, lb (\pm std dev)	502.1 (\pm 52.2)
Avg. duration of studies, days (\pm std dev)	99 (\pm 27.0)
Studies not reporting forage type	7

ance was demonstrated ($P \leq 0.01$) for control and Bovatec treatments, so that rate of weight gain (ADG) for control and Bovatec-fed cattle were compared within forage type using a two-sample t-test. Confidence intervals (95%) were computed for the difference in ADG between control and Bovatec cattle within forage type. With a 95% confidence interval results should fall within the range in 95% of observations due to the effect of Bovatec supplementation, whereas 5% of the observations should fall within the range due to random chance. Confidence intervals were used to determine the range of improvements in performance one would expect, and to determine if a positive improvement should be expected. Means used in all statistical analyses were based on individual studies within the database, with each study given equal weight.

Results and Discussion

When cattle grazed cool-season grasses, Bovatec improved ADG by 11.1% or 0.15 lb/hd/d (Table 2). The 95% confidence interval suggests a response range of 0.08 to 0.22 lb/hd/d improvement in daily weight gain when cool-season grasses are grazed. When cattle grazed warm-season grasses, Bovatec improved rate of weight gain by 11% or 0.14 lb/hd/d. The 95% confidence interval ranged from 0.10 to 0.18 lb/hd/d. Confidence intervals for Bovatec response when cattle graze warm-

and cool-season grasses overlap. This suggests that, when responses are averaged across Bovatec dose and supplement type, one would expect similar results from Bovatec on either warm- or cool-season grasses. Improvements in ADG for cattle grazing warm- and cool-season grasses were similar to the 0.14 lb/hd/d improvement in rate of weight gain noted previously for the overall data set (also see Technical Bulletin CD 0385¹). Cool-season observations consisted almost exclusively of hand-fed ground corn supplements, whereas, warm-season obser-

TABLE 2. Effect of grass type on cattle performance response to Bovatec.

Parameter	Bovatec Database		Difference ^a	% Change
	Control	Bovatec		
<i>Cool-Season Grasses</i>				
Number of observations	19	19	19	19
Mean ADG, lb/hd/day	1.48	1.63	0.15	11.08
Standard error	0.12	0.12	0.02	1.53
Upper confidence level ^b	1.65	1.82	0.22	17.80
Lower confidence level ^b	1.31	1.44	0.08	4.36
<i>Warm-Season Grasses</i>				
Number of observations	15	15	15	16
Mean ADG, lb/hd/day	1.46	1.59	0.14	11.03
Standard error	0.13	0.13	0.02	1.78
Upper confidence level ^b	1.70	1.85	0.18	14.51
Lower confidence level ^b	1.21	1.34	0.10	7.55
<i>Mixed-Season Grasses</i>				
Number of observations	25	25	25	25
Mean ADG, lb/hd/day	1.31	1.40	0.10	8.37
Standard error	0.10	0.10	0.02	1.39
Upper confidence level ^b	1.49	1.59	0.13	11.10
Lower confidence level ^b	1.12	1.21	0.07	5.64
<i>Winter Annuals</i>				
Number of observations	17	17	17	17
Mean ADG, lb/hd/day	1.94	2.14	0.20	10.49
Standard error	0.12	0.14	0.02	1.21
Upper confidence level ^b	2.19	2.41	0.24	12.85
Lower confidence level ^b	1.70	1.87	0.15	8.12

^a Values are the mean of Bovatec - Control obtained from each study. Consequently, differences calculated from Bovatec and control values in this table may not match means shown in the Difference column.

^b 95% confidence level

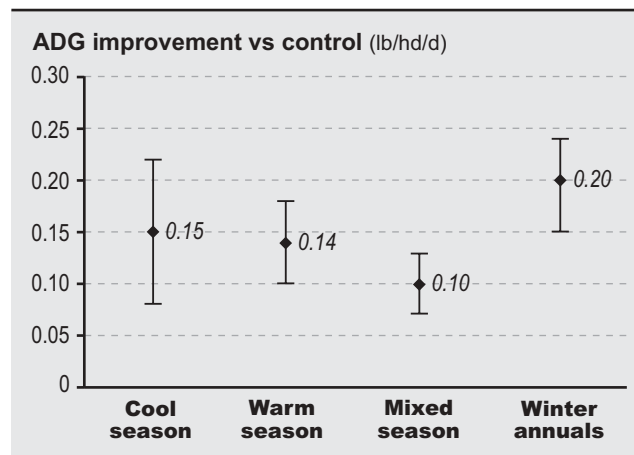
uations consisted of 8 hand-fed and 7 self-fed observations. Hand-fed supplements were ground corn. Self-fed supplements were a combination of loose mineral, grain plus minerals, soybean meal plus mineral, and Alpharma's liquid supplement formulation with Bovatec.

When cattle grazed mixed-season grasses or a mix of cool-season grasses and legumes, Bovatec supplementation enhanced daily weight gain by 8.4% or 0.10 lb/hd/d (Table 2). The 95% confidence interval surrounding the mean indicates a response range of 0.07 to 0.13 lb/hd/d improvement in rate of gain. Similar to the 95% confidence intervals noted with warm- and cool-season grasses, the confidence interval for mixed-season grasses indicates a consistently positive impact of Bovatec on growth performance. Reasons for an absolute Bovatec response that was below the overall mean of 0.14 lb/hd/d are unclear. Performance enhancement with Bovatec is dose dependent; however, only 6 studies included Bovatec at less than 150 mg/hd/d. Consequently, low Bovatec dose does not appear to explain why the response was less than other grass types. In 18 of the 25 observations a ground corn or sorghum grain supplement was hand-fed. In the remaining 6 studies loose mineral was fed in a free-choice manner. Supplement type may have interacted with forage quality to reduce overall performance and response to Bovatec. Utilizing protein-based rather than grain-based supplements that included Bovatec might have provided results more similar to those noted with cool and warm season grasses.

Cattle grazing winter annuals had a greater response to Bovatec when compared with other forage types (Figure 1). When supplements containing Bovatec were fed to cattle grazing winter-annual pastures, ADG was increased by 10.5%, similar to the improvement noted with warm- and cool-season grasses (Table 2). The absolute improvement in ADG, however, was 0.20 lb/hd/d, substantially greater than the other forage types (Table 2). The 95% confidence interval surrounding the mean ranged from 0.15 to 0.24. All supplements were hand-fed with the majority consisting of ground corn.

Confidence intervals for mixed-season pastures and winter annuals do not overlap, suggesting that mean responses are different (Figure 1). One should expect a greater response to Bovatec when used on winter-annual pastures than on mixed-season pastures. Supplement types

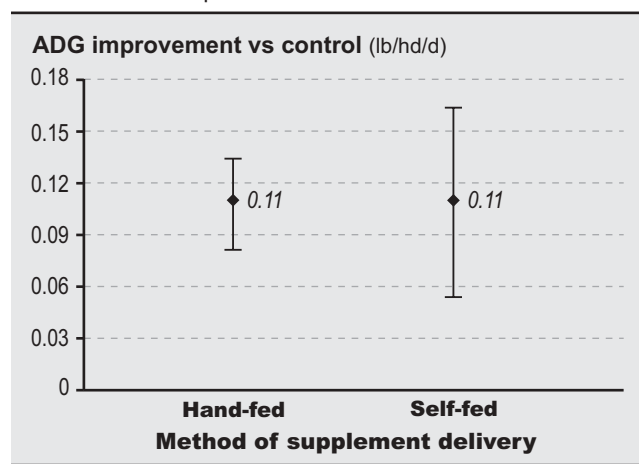
FIGURE 1: Average daily gain improvement by forage type caused by feeding Bovatec (\pm 95% confidence intervals).



included in the research studies summarized may bias the data more in favor of winter annuals. Ground corn supplementation would not be expected to have as detrimental an effect on nitrogen availability when cattle are grazing winter annuals. However, on poorer-quality mixed-season pasture the combination of ground-corn supplementation and Bovatec may combine to reduce nitrogen available for ruminal fermentation, bacterial growth, and forage digestion.

Free-choice supplementation programs continue to increase in popularity because of convenience and reduced labor costs. However, supplement consumption and responses to supplementation may be more variable when compared with hand-fed programs. The method of supplement delivery, hand-fed vs self-fed, appeared to influence Bovatec response when all data were compared. However, because of the impact of forage type on Bovatec response, comparisons between delivery methods must account for forage types represented. Self-fed observations occurred in mixed-season and warm-season grasses, whereas hand-fed observations occurred across all forage types. When Bovatec delivery methods were compared using only warm-season and mixed-season forage types (15 self-fed and 26 hand-fed observations), identical improvements in ADG were noted (Figure 2). However, response to Bovatec supplementation was more variable, as evidenced by a wider 95% confidence interval and a dramatically larger standard error (0.026 vs 0.014),

FIGURE 2: Bovatec enhancement in ADG compared with non-medicated control when delivered in hand-fed vs self-fed supplements within warm- and mixed-season pastures.



when Bovatec was supplied in a self-fed as compared with a hand-fed supplement. Greater variability in Bovatec response should be expected when supplied in a self-fed free-choice supplement because greater individual animal variation in supplement and Bovatec consumption occurs with free-choice supplementation than with hand-fed supplementation programs.

Summary

This Technical Bulletin demonstrates the consistency of cattle response to Bovatec supplementation and helps explain why variation in the magnitude of response might be expected. The confidence intervals surrounding mean responses to Bovatec supplementation across various for-age types are consistently positive. Under the conditions of the research studies summarized in this bulletin, responses obtained from Bovatec ranged from 0.20 lb/hd/d for cattle grazing winter annuals to 0.10 lb/hd/d for cattle grazing mixed-season grasses, with cattle grazing cool-season (0.15 lb/hd/d) or warm-season (0.14 lb/hd/d) grasses being intermediate.

Method of supplement delivery does not affect mean Bovatec growth rate improvements compared with non-medicated control-supplemented cattle. Supplements provided on a free-choice basis appear to result in a more variable response to Bovatec. Typically, consumption of hand-fed supplements and, consequently, of Bovatec are thought to be more consistent than with self-fed supplements. Individual animal variation in supplement and Bovatec consumption are thought to be the cause of greater variation in Bovatec response with free-choice supplementation programs.

Growth response is only one criterion that should be considered when selecting a feed additive for inclusion in pasture supplements. Other criteria such as palatability impacts on supplement intake, safety for cattle, and safety for other species that may consume supplement also should be considered. When all factors are considered, Bovatec remains the ionophore of choice for grazing cattle supplementation.

Literature Cited

1. Eighty-four-study summary of the effects of Bovatec on growth performance of cattle grazing pasture. Alpharma Animal Health. Technical Bulletin CD 0385; 2003.



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