Caloric Equivalency of Bovatec®

Introduction

When formulating replacement heifer rations, the following factors determine the value of supplementing Bovatec (lasalocid), and whether nutritional or management adjustments are needed:

- coccidiosis challenge
- desired growth rate
- environmental factors (parasites, weather, mud, etc.)
- feedstuffs available
- caloric equivalency (what is Bovatec worth in energy terms?)

Birth to Breeding

In a study with Holstein calves from birth to 12 weeks of age, Sinks et al. (1992) determined that the presence of coccidiosis increased the ADG benefit of Bovatec from 8% in the healthy, non-challenged calves to 50% in the disease-challenged calves. This amounted to a 13 pound body weight advantage for the healthy calves, and an additional 18 pounds for the challenged calves at 12 weeks of age. This indicates that the value of Bovatec increases when a coccidial challenge is present. Additional studies show that Bovatec increased ADG by 11.7% in young healthy calves, and by 13.1% in older heifers (Alpharma data, RCD 7659).

Breeding to Calving

The issues of optimum growth rate and environmental factors were addressed in a previous Technical Bulletin: "What are your replacement goals?" (RCD 9269). Once growth targets are established and a set of nutrient requirements is produced for a group of heifers, the next step is to determine the feed resources available (especially forage), then balance the ration(s) to meet those goals.

University of Minnesota/Waseca Study: Caloric Equivalency of Bovatec

To determine the energy value of feeding 200 mg Bovatec per head daily in bred heifers, Chester-Jones et al. (1997) conducted a 4-year study in which 72 Holstein replacement heifers were fed a basal alfalfa-haylage ration supplemented with minerals and vitamins (0 corn), 3 or 6 lb of added shelled corn per head per day (- Bovatec), or the above 3 treatments with 200 mg of Bovatec per head daily (+ Bovatec). Heifers were fed their respective rations individually through Calan gates until calving, and the following measurements were obtained: DMI, ADG, F/G, body condition score (BCS), wither height, urea space (a measure of lean body gain), and pelvic area. After calving, researchers measured dystocia incidence, udder edema

TABLE 1. Four-year feeding study results (all heifers).

	0 Corn		+ 3 lb Corn		+6 lb Corn		
Item	**– Bovatec**	**+ Bovatec**	**– Bovatec**	**+ Bovatec**	**– Bovatec**	**+ Bovatec**	**SE**
ADG (lb)	2.00	2.03	2.07	2.12	2.15	2.13	.09
DMI (lb)	24.16	24.56	25.27	25.00	24.58	24.40	.78
Final wither height (in)	53.80	53.60	54.10	53.30	53.50	53.70	.35
Final BCS	3.97	3.79	3.92	3.93	3.86	3.86	.07

and 150-day milk. In the overall study, 18 of the heifers came from a 1964 genetic pool, and the remaining 54 came from a contemporary genetic pool selected for milk production.

In the factorial analysis (Table 1), corn level increased ADG ($P < 0.02$), although Bovatec had no significant effect ($P > 0.05$). However, Bovatec increased ADG significantly ($P < 0.05$) in the first half of the study. Furthermore, the basal haylage ration (140-145 RFV) provided adequate energy for 2.0 lb ADG without supplemental corn or Bovatec. Despite the high energy levels fed, the researchers noted no deleterious effects of Bovatec on calving ease factors (calf birth weight, pelvic area, udder edema, post-calving weight loss). However, they noted a 13% improvement of dystocia scores when Bovatec was fed. Additional corn tended to increase dystocia ($P < 0.09$). Neither corn nor Bovatec affected 150-day milk production. Bovatec inclusion did not alter DMI, which, when expressed as a percentage of body weight, averaged 2.13% +/- 0.43%.

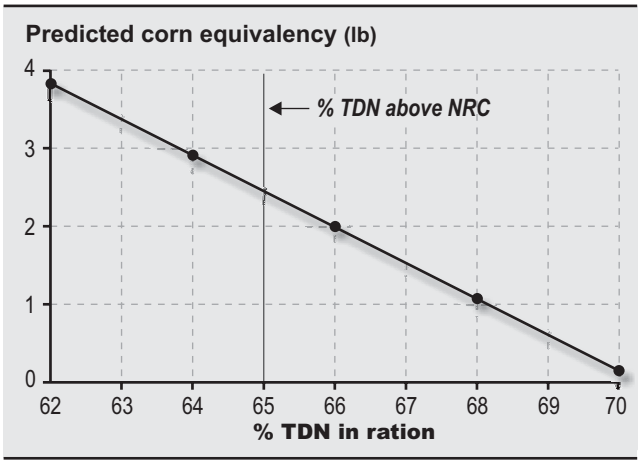
Detailed analysis of the data revealed that the 1964-genetics heifers showed less response to Bovatec, probably due to their lower lean growth rates, and that Bovatec increased ADG of the modern genetic herd ("Select" heifers) in the study. Because the Select heifers are more representative of today's genetics, data from these heifers were analyzed further

From Table 2, regression equations were developed (see below) to characterize the ADG responses to corn and Bovatec over the "response surface" of the study. Both DMI and observed ADG exceeded CNCPS (Fox et al. 1993) estimates, in part due to the high energy content (62% TDN) of the basal haylage diet. When the slope of the *corn vs ADG* regression line was compared to the slope of the *corn + Bovatec vs ADG* line, a predicted

TABLE 2. ADG results (select heifers).

Corn Level	– Bovatec	+ Bovatec
0	1.98	2.07
3	1.97	2.19
6	2.31	2.26

FIGURE 1: Bovatec corn equivalency.



equivalency line was developed. Figure 1 shows the equivalent pounds of corn predicted to produce the same ADG response as 200 mg of Bovatec/head/day.

Energy (Caloric) Equivalency Equations

From Figure 1, energy equivalency equations (see below) were developed for the range of energies used in the study. At the low end of the energy scale, response to 200 mg Bovatec/ head/day was more dramatic, tapering off toward the higher corn inclusion level. This makes sense, as maximum lean growth rates of 2.2-2.4 lb/day in post-bred heifers were observed, and DMI plateaued at the higher corn levels.

Energy Equivalency Equations:

1. **Corn: y = -0.5368 x + 3.61**, where y = predicted lb of corn saved and x = lb of corn in the ration (range of prediction accurate for 0-6 lb corn in ration)

2. **% TDN: y = -0.5368 x + 37.37**, where y = predicted % TDN savings and x = % TDN of ration (accurate range 62-70% TDN in ration)

3. **ME: y = -0.5368 x + 0.6118**, where y = Mcal/lb ME saved and x = Mcal ME/lb of ration (accurate range 1.02-1.14 Mcal ME/lb of ration)

4. **NE_g: y = -0.5368 x + 0.237**, where y = Mcal/lb NE_g saved and x = Mcal NE_g/lb of ration (accurate range 0.36-0.44 Mcal NE_g/lb of ration)

5. **NE_l: y = -0.5368 x + 0.3772**, where y = Mcal/lb NE_l, saved and x = Mcal NE_l/lb of ration (accurate range 0.63-0.70 Mcal NE_l/lb of ration)

Each equation predicts the ADG response to Bovatec most accurately (R^2 = 0.90) within the energy ranges used in the study. For ration energies outside of the accurate range, use the prediction closest to the energy concentration being fed. For example, for a 61 % TDN ration, use the prediction for 62% TDN.

Conclusions: Thumb Rules for Using Bovatec

1. With young calves, feed Bovatec at 1 mg/2.2 lb of body weight to control coccidiosis caused by *Eimeria bovis* and *E. zurnii* up to 800 body weight. In heavily-challenged herds, coccidiosis control is essential for acceptable growth rates later in the life cycle.

2. For replacements >400 lb, if ADG is below target or if environmental factors will decrease ADG more than 6 months during the year, feed 60-200 mg Bovatec/head/day to provide additional gain (0.14-0.20 lb/day) to reach the goal.

3. If current ADG is at target, decrease ration energy content 3-7% (depending on ration energy content; see above equations) when Bovatec is fed at 200 mg/head/day. Reformulate the ration for cost savings and to make use of more lower-quality forages to compensate. **Do not adjust expected DMI when Bovatec is included in the ration.**

4. If current ADG is above target, decrease energy content or DMI of the ration to meet the goal. Use Bovatec if an additional 3-7% energy decrease can be made, as economics are quite favorable (a $.015 investment in Bovatec can replace up to $.15 worth of corn).

Literature Cited

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Animal Health Division

Alpharma Inc.
One Executive Drive
Fort Lee, NJ 07024 USA
1-888-897-8657

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