

CEREVIDA[®] Yeast Extracts Bind Gram Negative Bacteria and CEREVIDA[®] EXCELL-M & PROVIDA[®] Calf Improve Calf Performance



Objectives of these study

The objectives of these studies were to determine (1) the binding efficacy of CEREVIDA[®] Yeast Extracts on field isolates of an *E. coli*, *Salmonella typhimurium*, and *Salmonella dublin* and (2) growth performance of high-risk Holstein bull calves fed CEREVIDA[®] EXCELL-M or PROVIDA[®] Calf during the pre-weaned period.

Study design

Experiment 1. In vitro binding of E. coli, Salmonella typhimurium, and Salmonella dublin

Seven treatments and 2 controls were included to evaluate the ability to bind a pathogenic *E. coli*, *Salmonella typhimurium*, and *Salmonella dublin*. The controls included Bovine Serum Albumin and a no plate coating, Blank. Treatments included a purified β -glucan isolated from yeast, 3 commercial products (Product #1, Product #2, and Product #3) reported to bind gram negative bacteria, and 3 CEREVIDA[®] Yeast Extracts (designated Soluble MOS, MOS, and YCW). Enzyme linked immunosorbent 96 well plates were coated overnight with the bovine serum albumin control and test products at concentrations equal to 0.01 mg/mL (product #3 was added at 0.1 mg/mL based on difference in suggested feed rate) in a physiologic salt buffer. The following morning the plates were rinsed 3 times to remove any product residue that had not adhered to the microplate. Live bacterial cultures of either the *E. coli*, *Salmonella typhimurium*, or *Salmonella dublin* were added to each well, and the microplates were incubated at room temperature for 1 hour. The microplates were washed to remove any un-bound bacteria and fresh growth media was then added to each well. The microplate was covered and incubated at 37°C in microplate reader with an environmental chamber for 12 hours. The absorbance of each well was analyzed every 15 minutes and the optical density (690 nm) of the of each well was adjusted to the colony forming units of bacteria bound by comparing to the growth kinetics of a known number of bacteria incubated in fresh broth on each microplate. Data reported as the average of bacteria bound by each product (CFU per μ g of product) conducted in triplicate.

Experiment 2. High-risk Holstein calves fed CEREVIDA EXCELL – M or PROVIDA CALF

Sixty Holstein calves were acquired from a commercial calf ranch within 24 hours of birth. Calves were blocked by initial total serum protein and body weight and randomly assigned to 1 of 3 treatments. Treatments included a Negative Control, CEREVIDA EXCELL - M (a proprietary blend of yeast extracts) at 2.5 grams per calf per day, and PROVIDA Calf probiotics at 2 billion colony forming units of a blend of a *Lactobacillus casei* and an *Enterococcus faecium* bacteria and 2 billion colony forming units of CEREVIDA Live Yeast per day. Both nutrition supplements were mixed into the milk replacer prior to feeding. All calves were managed identically. Calves were offered 1.55 pounds per day of a 22% CP 20% fat, all milk protein replacer and fed at 12% DM twice daily. Calves had ad libitum access to a 20% CP texturized calf starter and water. Calves were housed individually in plastic hutches with straw bedding. Calves were abruptly weaned at 56 days of age. Starter intake was measured daily and body weights recorded weekly. Data are reported as the cumulative starter intake from days 1 to 28 and 29 to 56, as well as the average daily gain from days 1 to 56.

Results

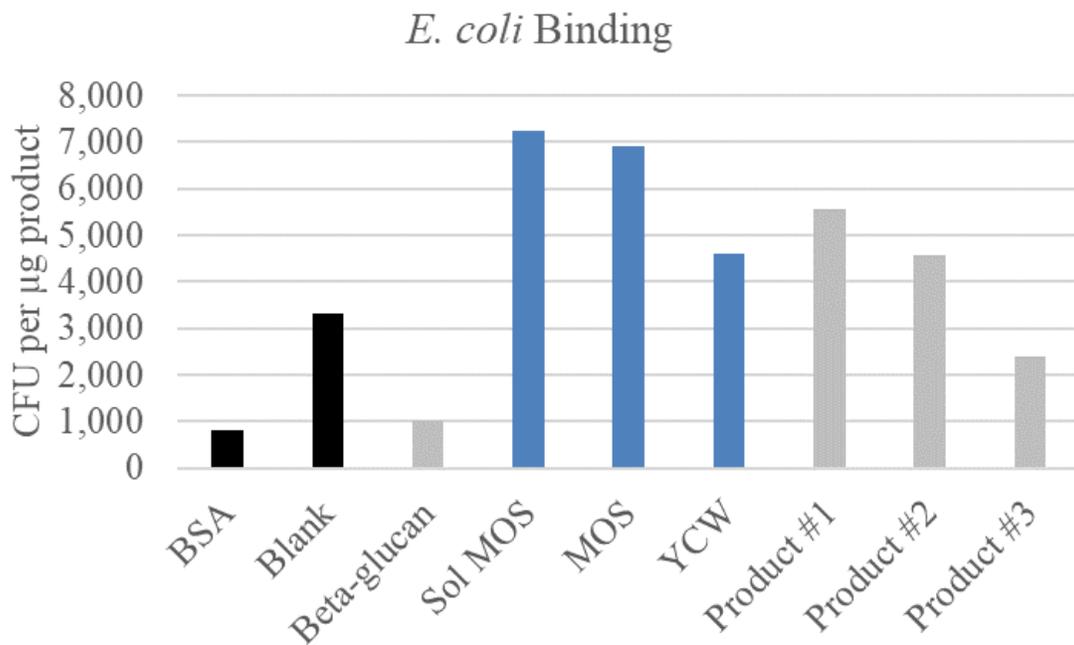


Figure 1. A comparison of the binding efficacy of an enteropathogenic *E. coli* by CEREVIDA® Yeast Extract (Sol MOS, MOS, and YCW) and 3 leading commercial products.

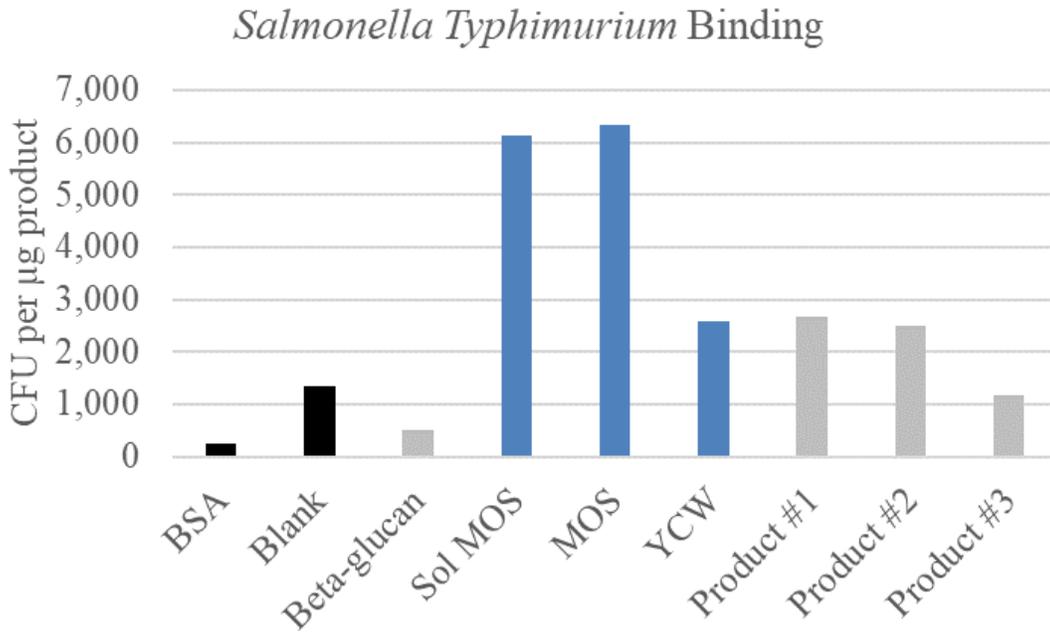


Figure 2. A comparison of the binding efficacy of a pathogenic *Salmonella typhimurium* by CERVIDA[®] Yeast Extract (Sol MOS, MOS, and YCW) and 3 leading commercial products.

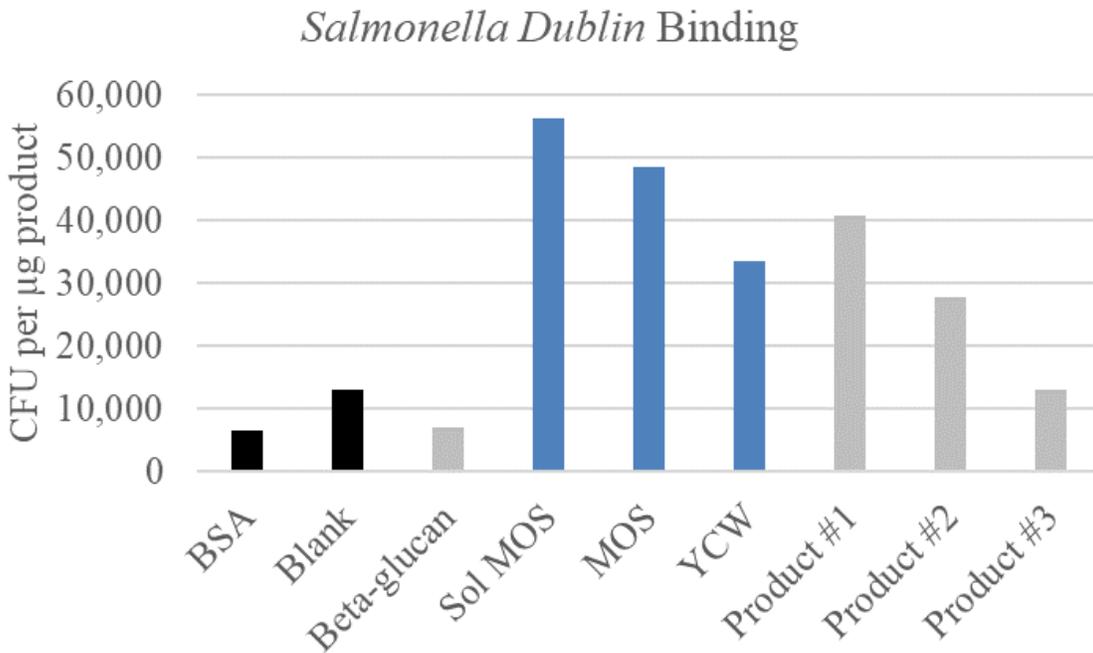


Figure 3. A comparison of the binding efficacy of a pathogenic *Salmonella dublin* by CERVIDA[®] Yeast Extract (Sol MOS, MOS, and YCW) and 3 leading commercial products.

Experiment 2

Table 1. Performance of high-risk Holstein calves supplemented with either CEREVIDA® EXCELL - M or PROVIDA® Calf probiotics (n=20 calves per treatment).

Variable	Control	CEREVIDA EXCELL-M	PROVIDA Calf	SEM	Trt
Initial BW, lbs	91.7	91.7	91.7	2.5	...
Weaned body weight, lbs	146.5	151.5	155.3	7.99	0.664
Preweaned starter intake, lbs	30.7	38.3	40.7	8.9	0.413
age 1 to 28 days, lbs	2.2 ^a	3.9 ^b	3.0 ^{ab}	0.6028	0.016
age 29 to 56 days, lbs	27.1	34.6	36.1	8.2	0.32
Preweaned ADG, lbs/d	0.97 ^a	1.06 ^{ab}	1.12 ^b	0.073	0.081

Means with different superscripts differ $P \leq 0.05$.

Conclusions

Experiment 1 indicated that CEREVIDA Yeast Extracts, particularly the Sol MOS and MOS extracts had a greatest *in vitro* capability to bind both an enteropathogenic *E. coli*, *Salmonella typhimurium*, and *Salmonella dublin* when compared to other leading commercial MOS products. Further in Experiment 2, CEREVIDA EXCELL–M and PROVIDA CALF calves consumed more calf starter during the first 4 weeks of life and numerically more starter over the entire pre-weaned period. In fact, the CEREVIDA EXCELL-M calves consumed on average 24.8% and PROVIDA CALF 32.6% more starter prior to weaning. Lastly, the CEREVIDA EXCELL–M and PROVIDA CALF calves numerically gained more body weight over the entire pre-weaned period, and weighed 5 and 8.8 pounds more at weaning than the Control calves. This was a 9.3% and 15.5% improvement in average body weight gain over the un-supplemented Control calves for EXCELL-M and PROVIDA CALF calves, respectively. These data indicate that supplementing calves CEREVIDA EXCELL-M and PROVIDA CALF may improve the health and growth performance of calves early in life.

- Directions for use
 - EXCELL: Lactating Cow = 5 grams per head per day
 - EXCELL – M: Calves = 2.5 grams per head per day
 - PROVIDA CALF: Add 1 gram per 10 calves daily to milk (replacer)
- Packaging
 - EXCELL: 50 pound (22.7 kg) bags
 - EXCELL-M: 10 kg pail or 50 pound (22.7 kg) bags
 - PROVIDA CALF: 500 g jar (5,000 daily feedings)

