



## RESEARCH >

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## Purina® Systemiq™ Probiotic Supplement Remains Alive and Active Through the Pelleting Process

A SUMMARY OF RESEARCH CONDUCTED AT THE PURINA ANIMAL NUTRITION CENTER EVALUATING THE SURVIVABILITY OF VARIOUS PROBIOTICS THROUGH THE PELLETING PROCESS.<sup>1</sup>

### < BACKGROUND >

Probiotics are increasingly being utilized in equine diets. However, pelleted equine feeds and supplements containing probiotics should be scrutinized to ensure that the bacterial strain utilized survives the pelleting process. Probiotics are more beneficial to the horse when they are provided in sufficient quantities of live, colony-forming units. The objective of this trial was to evaluate the survivability of various probiotic species, including the unique form of *Bacillus coagulans* (GBI-30, 6086) used in Purina® Systemiq™ Probiotic Supplement, through the pelleting process. While many *Bacillus* species are known to be heat-stable due to the spore-forming nature of the bacteria, different strains are likely to have different survival characteristics.

### < MATERIALS AND METHODS >

Pure bacterial cultures were obtained of the following probiotic species: *Lactobacillus casei* (Waseen Inc.®), *Lactobacillus reuteri* (Waseen Inc.®), *Enterococcus faecium* (Waseen Inc.®), *Bifidobacterium longum* (Waseen Inc.®), and *Bacillus coagulans* (GBI-30, 6086) (Kerry Group®). These bacteria were selected due to their common use in equine probiotic products. Five formulas were developed that included a single probiotic strain included to provide an identical quantity of (colony forming units) CFU/g. The base feed formulas were the same and contained a mix of alfalfa, wheat middlings, corn, soybean meal, cane molasses, and soybean oil. Mixed meals were produced utilizing a ribbon mixer and all products were subject to the same processing parameters. The mixed meals were fed into a pellet mill and pelleted at a temperature of 180°F. Pellets were cooled at ambient temperature. A sample of mixed meal prior to pelleting and a sample of the finished pellet were obtained for each individual probiotic-containing product.

Mixed meal and finished pellet samples were ground (500 mg), and an identical amount was plated on selective media and then incubated at 38°C for the appropriate amount of time based on the growth characteristics of the individual bacterial species.<sup>2</sup> Results were recorded as the number of colony forming units (CFU).

<sup>1</sup>HR 375. Evaluation of the viability of probiotics through manufacturing and following incubation in equine gastric juice. Jacobs, R.D. et al. 2023. Internal research, PANC.

<sup>2</sup>DFM Survivability post pelleting. Ayala, D. et al., 2023. Internal Research, PANC

## < RESULTS >

The objective of the trial was to evaluate the survivability of various probiotic species, including the unique form of *Bacillus coagulans* (GBI-30, 6086) used in Purina® Systemiq™ Probiotic Supplement, following the pelleting process. **Figure 1** shows the number of CFU's present pre-pelleting (mixed meal) and post-pelleting (finished product) for the selected bacteria. None of the selected bacteria survived pelleting except for the *Bacillus coagulans* (GBI-30, 6086). In fact, the post-pelleting sample of the product containing the *Bacillus coagulans* (GBI-30, 6086) had over 95% of the number of CFU's as the pre-pelleting sample. **Figure 2** shows a representative sample of the *Bacillus coagulans* product from the pre-pelleting vs. post-pelleting following plating while **Figure 3** shows a comparative image of the product containing *Lactobacillus reuteri*. It should be noted that the pre-pelleting concentrations were different for some products because of discrepancies in manufacturer guarantees. All products were formulated based off of the manufacturers stated concentration of the individual probiotic. To the extent these concentrations were not accurate, the starting concentrations were different.

## < CONCLUSIONS AND IMPLICATIONS >

Probiotics are commonly incorporated into equine feeds and supplements. However, the ability of these bacteria to survive the manufacturing process (i.e.: pelleting), is critical when considering their efficacy. This study demonstrates that four frequently utilized bacteria in equine probiotic feeds and supplements (*Enterococcus faecium*, *Lactobacillus reuteri*, *Lactobacillus casei*, and *Bifidobacterium longum*) were unable to survive typical pelleting conditions when tested individually. The bacterial strain utilized in Purina® Systemiq™ Probiotic Supplement, *Bacillus coagulans* (GBI-30, 6086), was able to remain live and active following pelleting, highlighting a unique characteristic supporting its inclusion into pelleted equine feeds and supplements.

FIGURE 1 Survivability of various select probiotic species pre- and post-pelleting.

PROBIOTIC	SAMPLE ID	Log10 (CFU/g)
<i>Enterococcus faecium</i>	PRE-PELLETING	6.47
	POST-PELLETING	NO GROWTH
<i>Lactobacillus reuteri</i>	PRE-PELLETING	5.48
	POST-PELLETING	NO GROWTH
<i>Lactobacillus casei</i>	PRE-PELLETING	4.64
	POST-PELLETING	NO GROWTH
<i>Bifidobacterium longum</i>	PRE-PELLETING	4.19
	POST-PELLETING	NO GROWTH
<i>Bacillus coagulans</i> (GBI-30, 6086)	PRE-PELLETING	5.75
	POST-PELLETING	5.47

FIGURE 2 Representative images of *Bacillus coagulans* (GBI-30, 6086) pre- and post-pelleting.

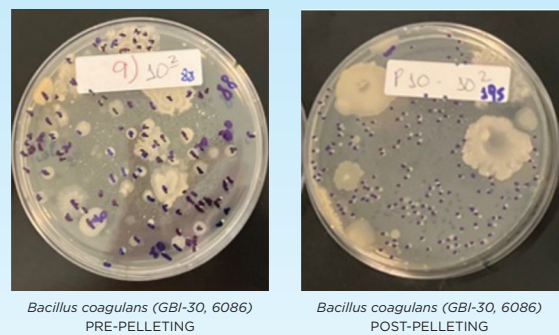
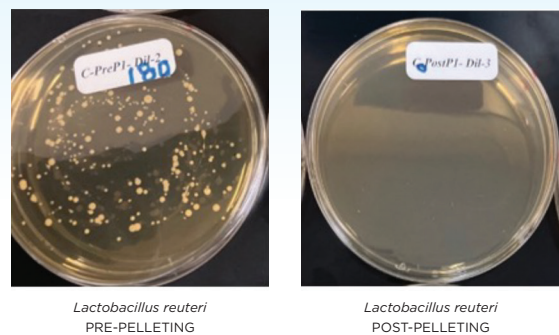


FIGURE 3 Representative images of *Lactobacillus reuteri* pre- and post-pelleting.



< FOR MORE INFORMATION > Contact your local Purina representative if you would like more information about this study or product.