

POLARDRY® ELECTROSTATIC DRYING:

Scalable Drying of Probiotic LGG

CASE STUDY

OVERVIEW

Historically, bacterial solutions have been dried using freeze drying, a batch process that is time-consuming and not easily scalable. Despite these drawbacks, freeze drying is preferred to the faster process of conventional spray drying, due to spray drying creating high thermal stress on the bacteria which leads to decreased bacterial viability and stability. Alternatively, PolarDry® electrostatic drying (ESD) allows for continuous drying at lower temperatures which decreases the thermal stress on the bacteria. Complete bacterial recovery is seen at both research and production scale with high powder yield, and comparable bacterial stability over a 4-week period at both ambient conditions and stored at 4°C.

POLARDRY® MODEL 001 AND MODEL 032 DRYING OF PROBIOTIC LGG

Lactobacillus rhamnosus GG (LGG, ATCC® 53103™) was dried in a mixture of maltodextrin DE18 and trehalose at both research and production scales.

HIGHLIGHTS

Bacterial Recovery

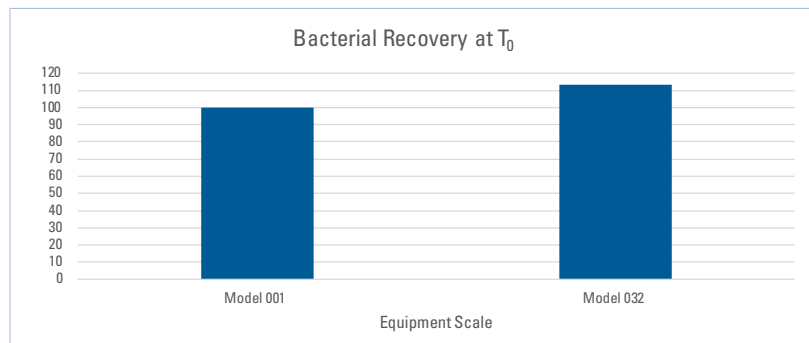
Complete bacterial recovery is achieved at both lab and production scale

Powder Recovery

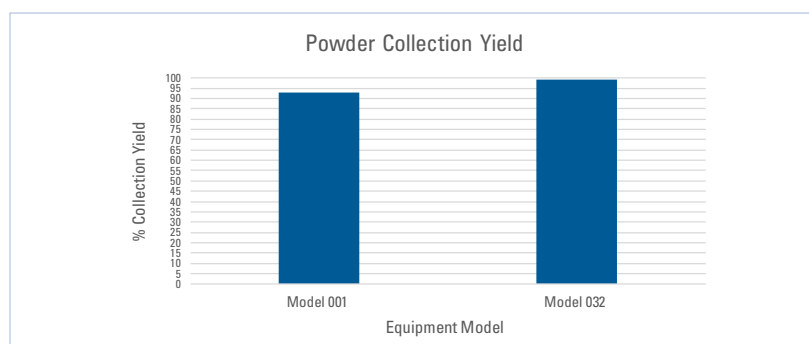
Over 90% collection yield is achieved at both lab and production scale

Stability

Samples stored at 4°C and ambient conditions have similar bacterial counts for both scales



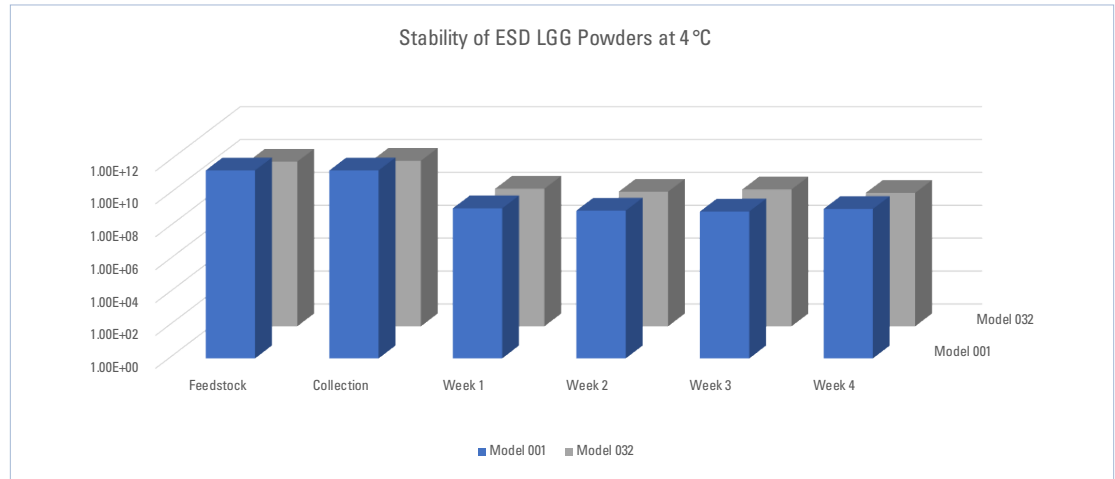
Collection material was tested immediately following processing. At both scales, full recovery was observed, indicating that outlet temperatures up to 53°C do not lead to thermal stress that decreases bacterial viability.



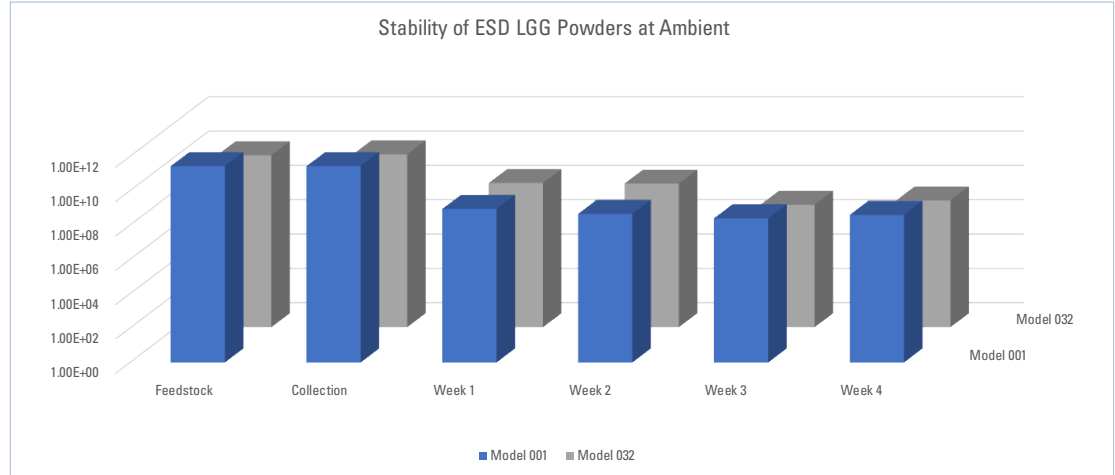
Yield on PolarDry® generally increases as the scale of the dryer increases. LGG follows this trend. Collection yield on the Model 001 scale is lower, but still high at 93.1%.

STABILITY OF POWDERS OVER FOUR WEEKS

Powders stored at 4°C followed the same trend at each scale: a drop in count at Week 1 followed by a leveling off through Week 4.



Powders stored at ambient conditions also followed the same trend at each scale. Both materials had a drop in bacterial counts at Weeks 1 and 3.



CONCLUSION

PolarDry® is an easily scalable technology that allows for continuous drying of microbial systems. As scale increases, the powder yield increases, the bacterial recovery of LGG increases, and the stability of the product follows the same trend as material produced on the research scale machine.



PolarDry® Model 001



PolarDry® Model 032

PolarDry® Models 001 and 032 are available for trialing at Fluid Air's Naperville, Illinois facility. Please reach out to Fluid Air for more information on the studies shown, or for information on the trialing services that are available.

