Incorporating Probiotics into Blending & Packaging Operations, Part 1

K-Tron

According to both the Food and Agricultural Organization (FAO) as well as the World Health Organization (WHO), probiotics are defined as “live microorganisms which, when administered in adequate amounts, confer a health benefit on the host”. These food supplements help to improve the intestinal microbial balance within any host, whether it be pets, livestock or human beings. Global use of probiotics has steadily increased over the last 10 years, mainly in dairy products such as yogurts and yogurt beverages.

However, even more recently, the introduction of probiotics in a powdered microencapsulated form for nondairy foods such as infant formulas, health food bars, breakfast cereals, snack foods, dry pet foods, and even chocolate has become commonplace in the food and pet food marketplaces.

This growing trend in the use of probiotics can be attributed to the increased media exposure emphasizing that intestinal balance is critical to obesity management, cancer prevention, as well as improved overall immune system health.

Introduction of Probiotics to the Packaged Product

Due to the delicate nature of the probiotic organism, the introduction of probiotics to the food processing or packaging stages requires special attention. The probiotic must be treated carefully during all stages of food processing to ensure that the probiotic viability is not affected and the overall efficacy is maintained.

K-Tron loss-in-weight (LIW) feeders and sanitary vacuum conveying systems are used in the highly accurate introduction of probiotic powders to continuous mixers, as well as for the contain

ed transfer and LIW batching to the final packaging container.

In the case of batch weighing of the probiotic to bulk packaging, such as a supersack or flexible container, the LIW batch principle is often employed. As explained in the following section, the K-Tron LIW batching system utilizes highly accurate K-Tron load cells to ensure an exact and controlled amount of product is introduced to the process or package below.

In addition, depending upon the room and space requirements, a specialized K-Tron bag dump station with integrated glovebox may be used to introduce the probiotics either directly to the feeder or into a pneumatic conveying system to transfer the product to a receiver mounted directly above the feeder hopper. In both cases, the system is completely contained, in order to avoid any outside contaminants interacting with the probiotic powder.

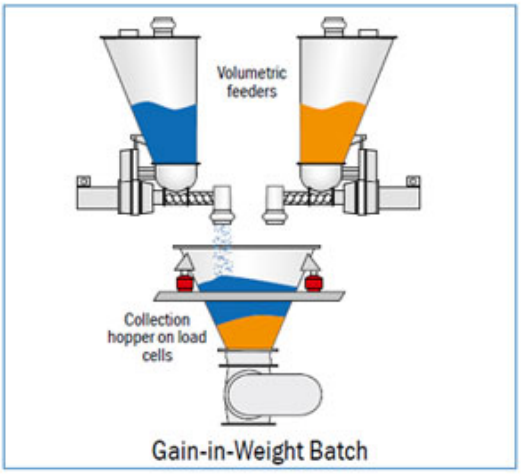
Batch Weighing Principles

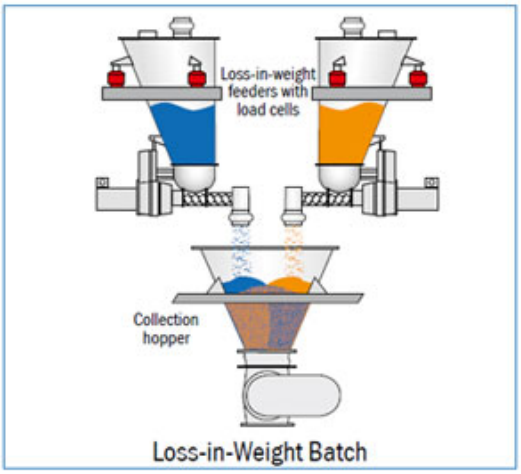
When delivering a powdered ingredient to a process, there are two modes of batch weighing which can be utilized. In Gain-in-Weight (GIW) batching, the system uses volumetric metering devices, such as a screw feeders or valves, to deliver the product to a collection hopper mounted on load cells. Only one component can be added at a time, resulting in a longer overall batch time.

Alternatively, the batching system may use gravimetric feeding devices, such as screw feeders, mounted on a weighing system to deliver the product to a collection hopper or even directly to the process by means of LIW Batching.

Loss-in-Weight Batching

In the case of probiotics addition, LIW batching is used because the accuracy of individual ingredient weights in the completed batch is critical and the percentage of the probiotic to the overall size of the final batch is very small.





For example, if one were to use GIW batching, the complete bulk bag or FIBC containing the major ingredients must be mounted on load cells with a high enough capacity to weigh the total weight of the bulk container. A weighing system of this size would not be able to accurately detect the typically small amount of the probiotic which needs to be added to such a large batch. Therefore, the use of a smaller LIW feeder to accurately weigh and deliver a minute amount to the container is more appropriate.

LIW batching also offers the advantage of a much shorter batch time when batching multiple ingredients. Since each LIW feeder has its own weighing system, several gravimetric feeders operating in batch mode can simultaneously feed multiple ingredients into a collection hopper.

A batch cycle is comprised of two phases. During the first phase, 90 percent of the batch weight (as determined by the preprogrammed recipe) is delivered as quickly as possible. In the second phase the last 10 percent is fed in a slower “dribble” mode to ensure an accurate batch weight equal to +/- 0.1 percent of desired setpoint.

Adjustment of the delivery speed (on/off, fast/slow) as well as the ability to quickly change batch setpoints based upon the packaging requirements is set using the K-Tron LIW batcher controls. LIW batching is often used for micros (such as vitamins and probiotics), where a highly accurate result is beneficial both to ensure the required product formulation and to avoid unnecessary waste, since these supplements are often very costly.

For more information, please visit www.ktron.com *[1]. Please tune into tomorrow's Chemical Equipment Daily for part two of this two-part piece.*

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