NUTRA-FLO®
PROTEIN PRODUCTS

Technical Bulletin #8

PRODUCT STABILITY AND SHELF-LIFE

Extensive testing and laboratory analysis was conducted on **Nutra-Flo's DPS®** products to determine stability and shelf characteristics. Similar digest products have been commercially produced and used for many years without any problems. Nutra-Flo produced **DPS®** on a pilot basis for over one year to provide verification of product safety before marketing the product.

Nutra-Flo is a member of the Animal Protein Producers Industry, Inc. (APPI) Salmonella Reduction Program. As part of this program, members are required to submit samples each week for salmonella testing. Since the beginning of participation in the program in 1997, every sample submitted by Nutra-Flo has tested negative for presence of salmonella.

Below we have reported the highlights of several stability and shelf-life tests.

Bacteria Challenge Studies

Salmonella Test

A 20 gram sample of DPS® CPS 21 was inoculated with a cocktail of three strains of salmonella bacteria. Salmonella levels were measured immediately and after seven days.

Initial Inoculation	60,000 units per gram
0 Days	7,900 units per gram
7 days	< 10 units per gram

E.coli Test

A 200g sample of DPS® (CPS 21) was inoculated with a cocktail of 3 strains of E.coli bacteria. Levels of E.coli were measured immediately and after 7 days.

Initial Inoculation	10,000 units per gram
0 Days	970 units per gram
7 days	< 10 units per gram

In one study various concentrations (35%, 40%, 45% and 50% solids) of CPS were stored at 70 and 100°F, and monitored for mold growth, foaming, carbon dioxide generation and seperation. Additionally, some CPS was mixed with cane molasses to 60% and 65% solids and stored under these same conditions.

- Results for Samples Stored at 100°F -

	DAYS TO MOLD	FOAMING	CO_2	SEPERATION % AT DAY 70	DAYS TO SEPERATION
CPS/65% Cane Molasses	no mold	no	no	0	70+
CPS/60% Cane Molasses	no mold	no	no	0	70+
CPS (50% Solids)	no mold	no	no	0	70+
CPS (45% Solids)	no mold	no	no	5	22
CPS (40% Solids)	48	no	no	15	10
CPS (35% Solids)	35	no	no	25	5

The CPS used to make these samples were tested for bacteria levels at day zero and then all samples were tested after being stored 70 days at 100°F.

	PSEUDOMONAS	E-COLI	SALMONELLA	TOTAL PLATE COUNT	ANAEROBIC COUNT
Day 0: CPS	< 10/gram	< 10/gram	0/gram	690/gram	< 10/gram
Day 70 Samples:					
CPS/65% Cane Molasses	< 10/gram	< 10/gram	0/gram	700/gram	< 10/gram
CPS/60% Cane Molasses	< 10/gram	< 10/gram	0/gram	710/gram	60/gram
CPS (50% Solids)	< 10/gram	< 10/gram	0/gram	260/gram	< 10/gram
CPS (45% Solids)	< 10/gram	< 10/gram	0/gram	320/gram	< 10/gram
CPS (40% Solids)	< 10/gram	< 10/gram	0/gram	7,300/gram	< 10/gram
CPS (35% Solids)	< 10/gram	< 10/gram	0/gram	80,000/gram	< 10/gram