Stargate Project Evaluation Soy-based Target Disc

Product / Project Description:

A soy-based, 100 percent biodegradable, target disc for skeet and trap shooters. Conventional target discs are typically manufactured with clay or limestone, petroleum pitch and florescent paint. These conventional types do not breakdown once used and are potentially toxic. Soy target discs breakdown quickly and are inert to their environment.

Bench / Lab Production:

Soy-based target discs were developed through the 2008 Student Soybean Product Innovation Competition. No additional testing or formulation was completed outside of the Contest parameters.

Product Functionality and Properties:

The Standard:

According to the National Skeet Shooting Association (NSSA), a standard target disc: (The most commonly used target of all) must weigh approximately 3.5 ounces and be of 4.25 inches overall diameter and 1.125 inches in height. No indication is given as to the "breakability," although our research determined that conventional discs broke at 131.1 Newtons (29.8 pound-force) on a 1,000 pound (4448 N) load cell SIMTech force analyzer.

Our Product:

The soy-based disc met the dimensional requisites of the NSSA standard. Weight varied. The soy discs broke at 169.4 N (38.1 pound-force) on the same load cell SIMTech force analyzer used to test the conventional discs. This could be corrected with material thickness and / or composition.

Freedom to Operate:

ISA patent attorneys (Bose McKinney and Evans) strongly believe that this composition is novel and open for exploitation.

Intellectual Property:

The inventors of the soy-based target disc were students at Purdue University competing in the Student Soybean Product Innovation Competition. As such, all discoveries were assigned to the Purdue Research Foundation in accordance with the ISA – PRF Master Research Agreement.

ISA has elected to pursue patent protection with the United States Patent and Trademark Office (USPTO) and take the responsibility of lead prosecution.

A provisional patent application has been filed with the USPTO (Serial No, 61/153,121).

For additional information, see attachment "A."

Soy-based Target Disc Preliminary Business Assessment

The Market:

- Trap shooting was developed in 1920 and took modern form in 1923 today, many variations exist
- Hundreds of shooting clubs and events take place annually in the U.S.
- Approximately 17 million "active target shooters" people who participated in at least one regulated shooting event last year¹
- 4 million actively participate in trap / skeet shooting
 - o 84% are male 16% female
 - The average trap / skeet shooter age is 33 with a household income of \$68,900
- 3 million actively participate in sporting clays
 - 81% are male 19% female
 - o The average sporting clays shooter age is 34.3 with a household income of \$68,300
- Between 1998 and 2005, sporting clays have grown by 8.4%.

Market Size and Growth:

- Difficult to determine exact market size of clay targets
- Hunters and target shooters spend \$30 billion annually – however clay targets would be a small portion of this expenditure

Competition:

- There are basically three target disc manufacturers in the US – Champion, Remington, and White Flyer
- All three manufacturers have stated interest in biodegradable targets
- White Flyer is the only major brand marketing a "biodegradable" target (with warning that severe soil damage may occur due to pH and full decomposition may take several years)
- Several issued patents exist on "compressed discs" usually centered on birdseed – to our knowledge, none are in production

Strengths:

- Simple formulation
- Evidence of superior biodegradability
- Performs similarly to standard conventional clay targets
- Exhibits potential of similar manufacturing to conventional clay discs
- Price

Weaknesses:

- Current formulation is centered on soy meal
- Shelf life
- Lack of testing / research
- Easily could replace soy components with other products (i.e. zein, DDGs, etc)
- Price

Opportunities:

- Possible reformulation to center on low-value / waste products like hulls instead of meal
- Two of the major manufacturers have production plants in Indiana
- Renewable / green

Threats:

- Previous "biodegradable" targets that do not perform or meet current standards have attached stigma to new products
- Food vs. industrial product argument
- Anti-gun / shooting sports groups and policies
- Only three U.S. Manufacturers

Economic Analysis:

Assumptions:

- A case (135) of regular pitch based clays cost \$9.00 and the leading "biodegradable" target is \$11 per case
- There are 1000+ gun clubs in the US
- Each gun club buys a minimum of two skeet loads (1512 cases per load) each year

Then:

- Minimum market size is \$27 million
- A 5 percent penetration = ~ \$1.36M; 10 percent = ~\$2.72M
- Royalty rate of 1 percent = \$13,000 \$27,000 per year

Soy-based Target Disc Preliminary Development Plan

Key Research Questions:

- Can reformulation take place to include low-value by products?
- Determination (and correction) of shelf life and product stability.
- Breakability performance and product endurance (expulsion from throwing system and impact performance).

Milestones:

- Successful reformulation that meets weight and density requirements
- Alternative formulations with non-soy and other feedstocks (ID for IP disclosures)
- Live field testing with a trap or skeet club

Activities:

- Select a research and development lab for formulation and development
- Identify potential partners for commercialization / development

Timeline:

Activity / Milestone	Estimated Start	Estimated Finish	Estimated Days	Actual Start	Actual Finish	Actual Days	Variance	Estimated Hours	Actual Hours	Variance
Select R&D Lab	1-Aug-2009	30-Aug- 2009	29					20		
ID Potential Partners	1-Aug-2009	15-Aug- 2009	14	e e e e e e e e e e e e e e e e e e e				10		
Reformulation	1-Sep-2009	30-Nov- 2009	89					200		
Alternative Non-Soy Form.	1-Dec-2009	30-Jan- 2010	59	1. 4.				80		
Live Testing	1-Apr-2010	1-Jun-2010	60					40		
				1.						110101
TOTAL			251			-	-	350	_	_

Product Specifications:

- Conform with National Skeet Shooting Association standards for competition target discs
- See Attachment "B"