FOOD SCIENCE PROCESSING AND INNOVATION CENTER

NC STATE UNIVERSITY
College of Agriculture and Life Sciences

Why This Investment is Important:

The Manufacturer's Dilemma

How do food manufacturers satisfy consumers' demand for healthier food products that taste great – yet are also shelf stable and convenient to eat?

Both fruits and vegetables and lean plant or animal proteins can develop undesirable textures, odors or flavors when concentrated into convenient snack foods like protein bars.

NC State Finds A Solution

Our solution was simple: bind healthy edible proteins with the bioactive compounds in fruits and vegetables.

We produced concentrated, shelf-stable, flour-like powders from readily-available sources. They had pleasant, neutral flavors – and all the source materials' anti-inflammatory and immune-protective benefits.

These powders can be blended into popular snack foods like bars, crisps and smoothies. Economic value is easily added by the ability to use "ugly" produce that would not be selected by grocery stores, or pomaces from food processing – like the leftover solids from wine grapes.

Opportunities Missed – Why We Need A GMP-Level Lab:

Better MREs for the U.S. Army

If an army travels on its stomach, it needs great rations. NC State found a way to convert the disease-preventing, immunoprotective compounds from two servings of muscadine grapes, blueberries or kale into a spoonful of concentrated protein-enriched powder.

Now soldiers could get all those health benefits, even if they didn't have access to local produce. The powder performed well in cell culture and animal models. The U.S. Army's Natick Nutrition Labs even used it to create a shelf-stable, protein/fruit-enriched spread. Next stop? MREs!

But because NC State lacked a GMP-level lab, we could not provide enough product to conduct human clinical trials – or demonstrate an exciting new product to the commercial food industry.

Space Age Mars Bars for NASA

When it really, really has to be shelf-stable, NASA can count on NC State. The space agency needed a chewy, protein-plant phytochemical-enriched bar that would stay shelf-stable – and tasty – all the way to Mars and back.

So, we took whey protein and mixed it with cranberry compounds. Our test model bars remained soft and flexible, unlike typical high-protein bars. As a bonus, the nutrients in our protein powder-based bars were much easier to digest, providing longer term benefits than whey proteins alone.

Sadly, due to the lack of a GMP-level lab, we couldn't conduct the clinical trials needed to help the project take off. And we may never know if it could have been the next Tang.

Note: GMP stands for Good Manufacturing Practice, the industry standard for food-grade testing. MRE stands for Meals-Ready-To-Eat, the U.S. Army's most common ration.

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A Stronger Food Science Partnership

North Carolina's Dept. of Agriculture and Consumer Services and NC State University are working together to establish the Food Science Processing and Innovation Center (FS-PIC) in the Core Laboratory of the North Carolina Research Campus (NCRC). As noted in 2014's *Food Processing and Manufacturing Economic Feasibility Study*, it will:

- Act as a hub for the state's food entrepreneur network,
- Unite the food processing entities in our state, and
- Accelerate projected economic benefits and job growth potential.

Growing Our Ag and Food Economy

Expansion of our food manufacturing capabilities will help grow North Carolina agriculture into a $100B industry by 2025. While many commodities are grown here, only 20% of the state's agricultural GDP comes from food manufacturing. Areas ripe for growth include:

- Niche opportunities for value-added food and beverage products.
- Increased demand for local foods and improved food safety.
- Ancillary growth in R&D, travel, construction, trucking, professional services.
- Expanded potential of the NCRC as an innovation center for food.

Committed Partners. Common Goal.

The NCRC, featuring the state-of-the-art David H. Murdock Research Institute, provides an ideal location for FS-PIC. Transforming 14,000 sq. ft. on the first floor of the Core Laboratory will accommodate the proposed master concept, with the following partners and resources committed to make it happen:

Partner Investment Expectations

- **NCRC**
  - $2.8M in capital for FS-PIC facility *(non-recurring)*
  - Favorable terms for long-term lease *(recurring)*
- **NC State**
  - $350K/annual for staffing 4 positions: *(recurring)*
    Director, Food Process Engineer (faculty), Support staff (2)
- **NCDA&CS**
  - Marketing support *(recurring)*

Additional Investment Needed

- **NCRC**
  - $4.4M to upfit FS-PIC facility *(non-recurring)*
- **NC State**
  - $2.2M for FS-PIC equipment *(non-recurring)*
  - $700K/yr lease and operating expenses *(recurring)*
- **NCDA&CS**
  - $1M for launch phase of FS-PIC marketing-related initiatives *(non-recurring)*

Strengths

- Accessible to industries.
- On-site presence for industries with potential interest in space.
- Ideal space available in the Core Laboratory, adjacent to potential academic and industry partners.
- Strategic fit with NC State faculty.

Opportunities

- Solidify current, and build new, industry partnerships.
- Recruit new industry to NCRC – articulated by interested large industries currently on campus.
- Expandable Core Laboratory space.
- Optimal balance of current food manufacturing operations with ability to assess innovative technologies.
- Opportunity to pilot-test laboratory research and innovative discoveries in a GMP facility, providing proof of principle for new technologies.

The Food Processing Initiative is a partnership between NC State University's College of Agriculture and Life Sciences and the North Carolina Department of Agriculture and Consumer Services.

Benefits to Three Key Groups:

Large Food Processors and Manufacturers

N.C. currently has 13 beverage manufacturers – well behind California (75)**, Texas** (39)**, and Florida** (29)**.**

- GMP-certified lab and pilot plant for testing advanced packaging technologies developed at NC State, and leading-edge manufacturing equipment – much of which is manufactured in North Carolina.
- Developing new beverage flavors, extracts and sensory technologies.
- Increasing North Carolina's competitiveness in recruiting future fruit and vegetable juice and cocktail manufacturers to the state.

Economic Impact:

Projected growth of Advanced Packaging Technology Market by 2019 = $8.2B
Capturing just 1% of that growth = $5M impact to N.C. economy

Projected growth of Beverage Market by 2019 = $33.4B
Capturing just 1% of that growth = $300M impact to N.C. economy

Projected growth of Beverage Flavor Market by 2019 = $1.58B
Capturing just 1% of that growth = $45M impact to N.C. economy

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Food Entrepreneurs and Small Businesses

- Connecting N.C. food entrepreneurs to local farmers – expanding the market for local crops and ingredients.
- Providing production-level testing of formulas and recipes in a GMP-certified test lab and pilot plant.
- Partnering with NCDA&CS to improve the marketability of new North Carolina-based food and beverage products.

Economic Impact:

- N.C. Farmers benefit from additional customers purchasing crops at or above market rates.
- Additional customers for our farmers will create new jobs for local economies.

N.C. Food Processing and Manufacturing Partnership

Revenue and licensing from FS-PIC will be reinvested into food science research and innovation, new manufacturing equipment, and product marketing and consulting services.

- Amplifying NCRC return on investment
- Strengthening NCDA&CS' product marketing and agribusiness programs.
- Increasing impact of NC State's Entrepreneurial Initiative 4 Food (EI4F) – assisting 500+ companies a year
- Driving future innovations from NC State University's Department of Food, Bioprocessing and Nutrition Services

Innovating Our Economy

FS-PIC will make North Carolina a hub for food processing and manufacturing innovation. With the state's agricultural assets, acclaimed food science research and partnerships, FS-PIC will enable new opportunities for food entrepreneurs and enterprises across the state and around the country, with tremendous economic impact for our state.

NCDA&CS' $1M Marketing Investment

NCDA&CS provides North Carolina farmers and food businesses a variety of opportunities to connect with customers – whether it's the end-use consumer, retail or wholesale outlet, or a manufacturing facility.

These marketing funds will be used to expand the following programs:

- Host grower/buyer meetings to connect farmers with prospective customers. *Buyers include supermarkets, wholesalers/distributors, military installations, food manufacturers, and institutional buyers.*
- Promote inbound and outbound international trade missions to expand reach for N.C. farmers and food companies – expanding participation opportunities for emerging N.C. food operations.
- Strengthen existing promotional campaigns around selected N.C. commodities when they are in season.
- Increase entrepreneurial services available through our Agribusiness Development initiatives by offering:
  - Revolving loans for qualified applicants to assist with expansion expenses;
  - Funding for the development of a food entrepreneurship boot camp for prospective food business start-ups;
  - Increased statewide education and outreach activities to improve business skills for food entrepreneurs.

Industry Support

Major international corporations and innovative local start-ups agree that FS-PIC would benefit their commercial endeavors and facilitate economic growth in our state. Here's what leaders in the food and research industries are saying:

"We see tremendous value in leveraging this facility to expand our research capacity – and as a gateway to engage with world-class research faculty at the N.C. Research Center, Plants for Human Health Institute and NC State."

– Rodney Green, Conagra Brands

"Our partnerships with several large companies with facilities in North Carolina could be further enabled by being able to work together in such a space."

– William R. Aimutis, Cargill

"With a focus on research and collaborative industry engagement, this new initiative would be unique among other pilot-scale processing centers currently available at academic institutions."

– Minhthy Nguyen, MeadJohnson Nutrition

"This initiative has the potential to be a center of innovative public-private collaboration and a great asset for North Carolina and the food industry."

– Corey E. Scott, General Mills