

# **GENERAL PROBIOTICS**

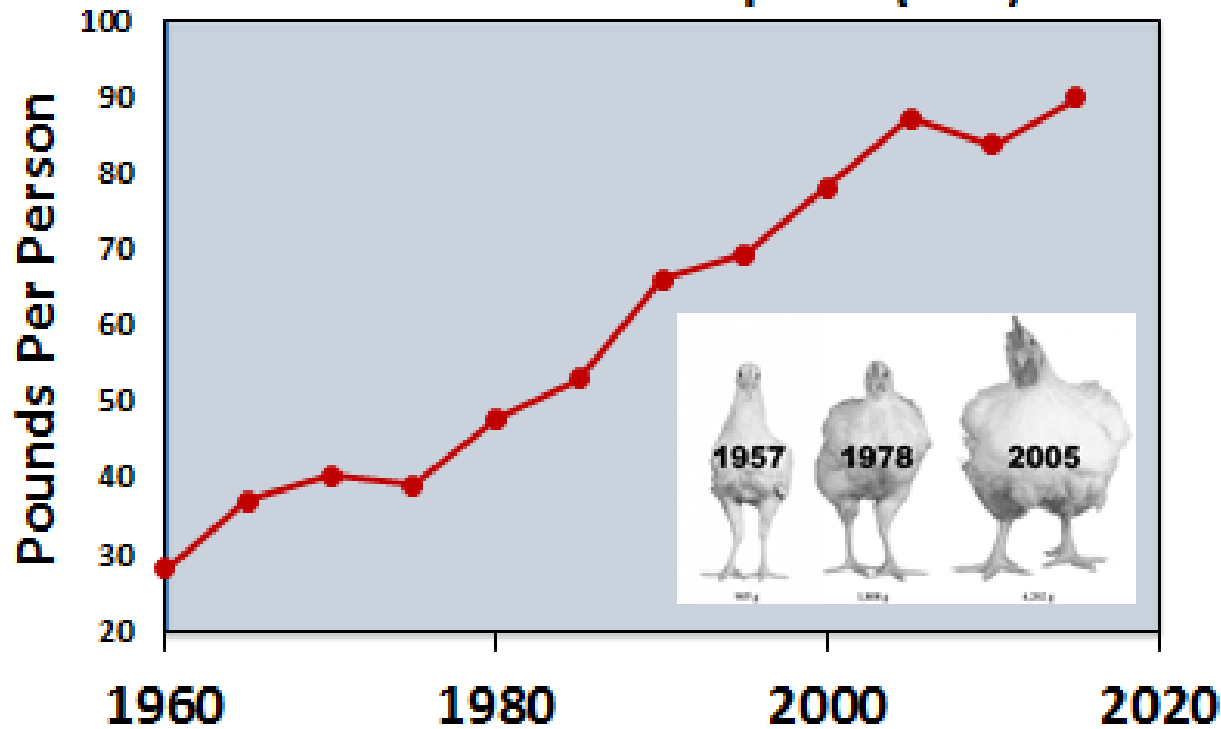


**Fighting Bacterial Pathogens. Securing Safe Food Production.**

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# URGENT NEED FOR NEW ANTIMICROBIALS

Chicken Consumption (U.S.)



Increasing demand

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Weather instabilities

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Pathogens

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FDA's Veterinary  
Feed Directive

# PROBIOTICS AS ALTERNATIVES

**Direct-fed microbials**

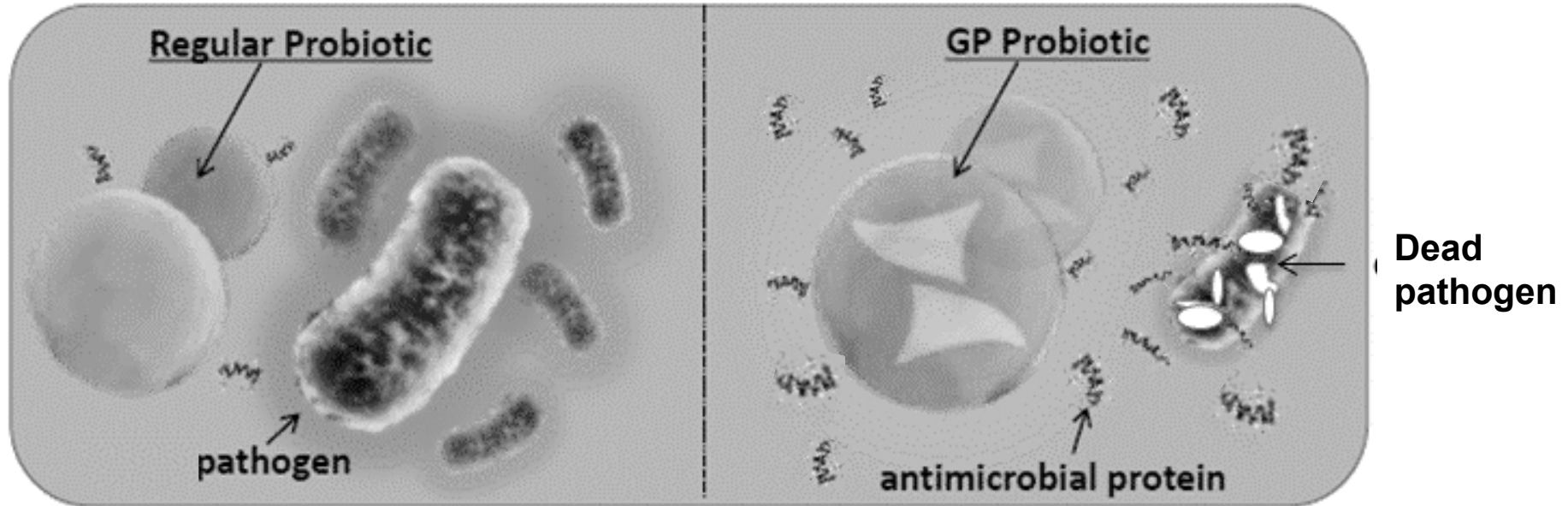
**Inconsistent  
performance**

**“CLAIMS FOR  
THESE  
PRODUCTS MAY  
BE CONSIDERED  
PUFFERY.”**

**-FDA**



# ADVANCED ANTIMICROBIAL PROBIOTICS...**THE SOLUTION**



**Designed activity  
against  
pathogens**

**Safe,  
effective,  
versatile**

**Performance  
delivered  
beyond puffery**

# TEAM

## EXPERIENCE THAT MATTERS

### CUTTING-EDGE DISCOVERIES

Unique fund of knowledge in antimicrobials & synthetic biology.

### COMPETITIVE ADVANTAGE

40 years in business development & IP strategy.

### SUSTAINED RESULTS

25 years in cost-effective project management & corporate finance.



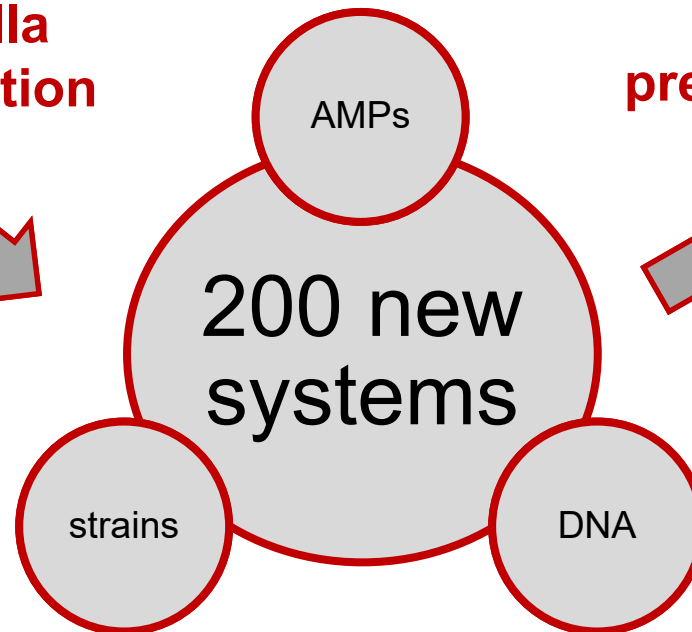
# FIRST-IN-CLASS

## PROVEN INNOVATION



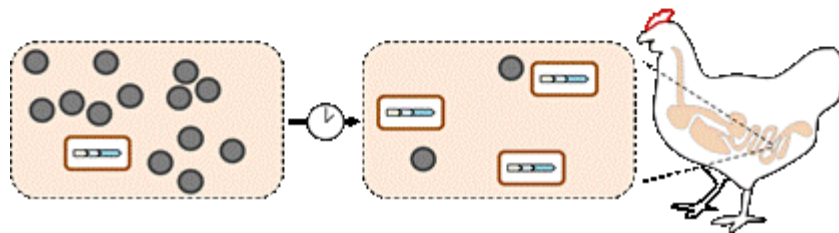
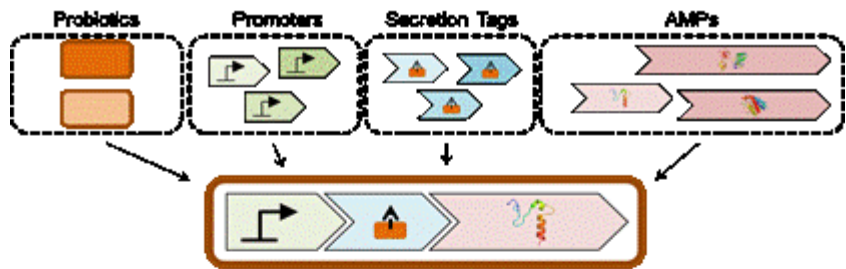
50% Salmonella  
prevalence reduction

90% Salmonella  
prevalence reduction



# SYNBIO PLATFORM

## INTELLIGENT ENGINEERING



Library of  
components

Optimize live  
biotherapeutics  
for performance  
in the gut

Synthetic  
biology

# IP STRATEGY

Patent #1  
Genetically modified microbes that can detect pathogens and then secrete antimicrobials against pathogens

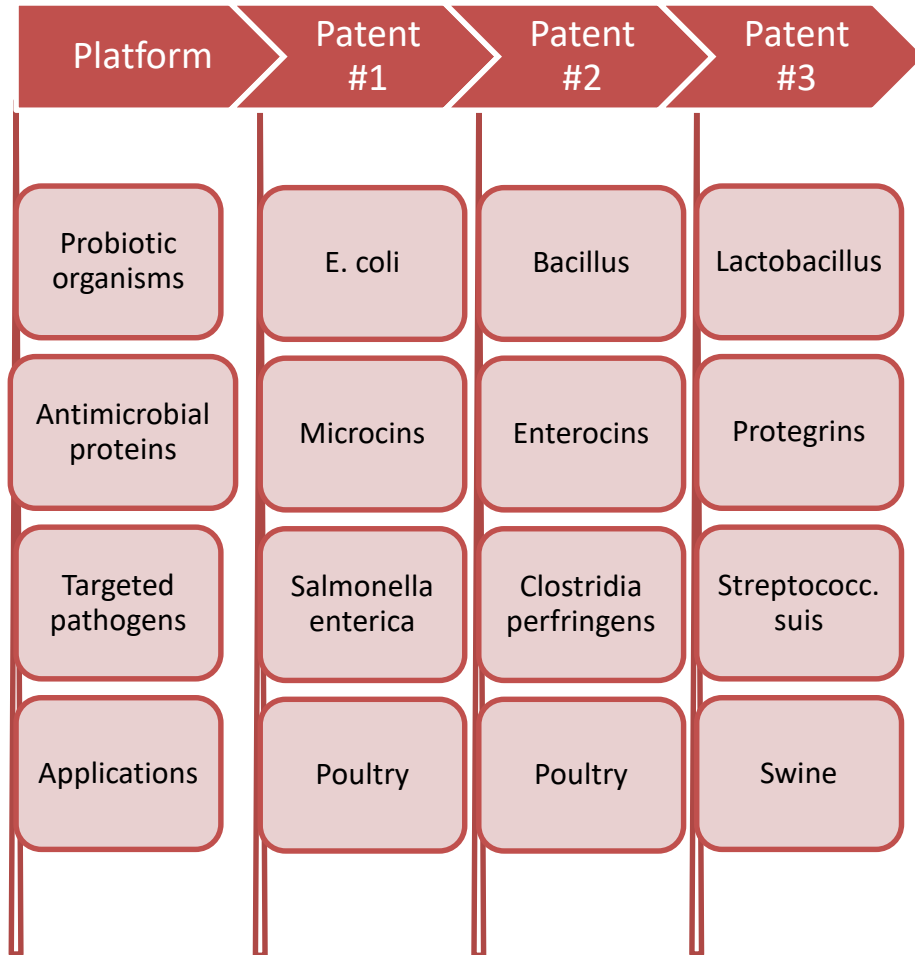
**Provisional**  
:2012  
**Issued:** 2018  
**Divisional:**  
2018

Patent #2  
Genetically modified microbes that secrete multiple antimicrobials, lowering resistance emergence

**Provisional**  
:2015

Patent #3  
Genetically modified microbes that secrete engineered antimicrobial lysins

**Provisional**  
:2017



University of Minnesota IP

Company IP pipeline



# MILESTONES

*milestones in red are completed*

## R&D Milestones

- **Evolve prototype against *Salmonella***
- **Prove efficacy & safety in field trial**
- **Prototypes vs. *Campylobacter* & *Clostridia***
- **Product formulation**
- **Scale-up fermentation**

## Business and Financial Milestones

- **Raise >\$1M in SBIR funding and owner funds**
- **Establish strategic partnerships**

## Regulatory and Licensing Milestones

- **Contact FDA CVM**
- **Pre-IND meeting with FDA**
- **GMP, CMC, animal efficacy/safety, environmental impact studies**



# **RISKS**



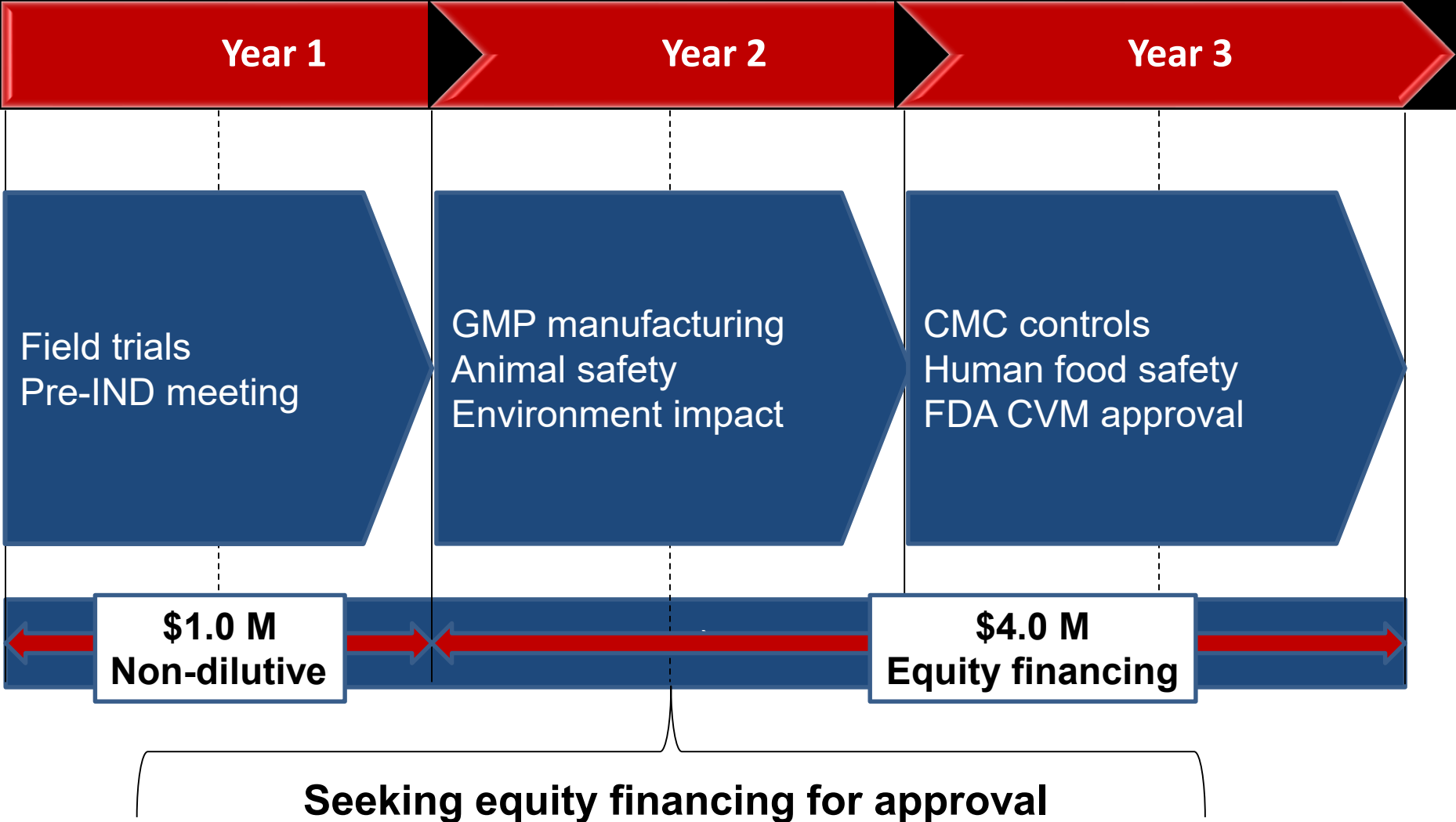
- 1. Transfer to production**
  - 2. Genetically engineered (GE) biotherapeutics**
  - 3. Regulatory approval path**
- 

**Tests at  
industry-  
recognized  
CROs**

**GE products  
are routinely  
used in  
humans**

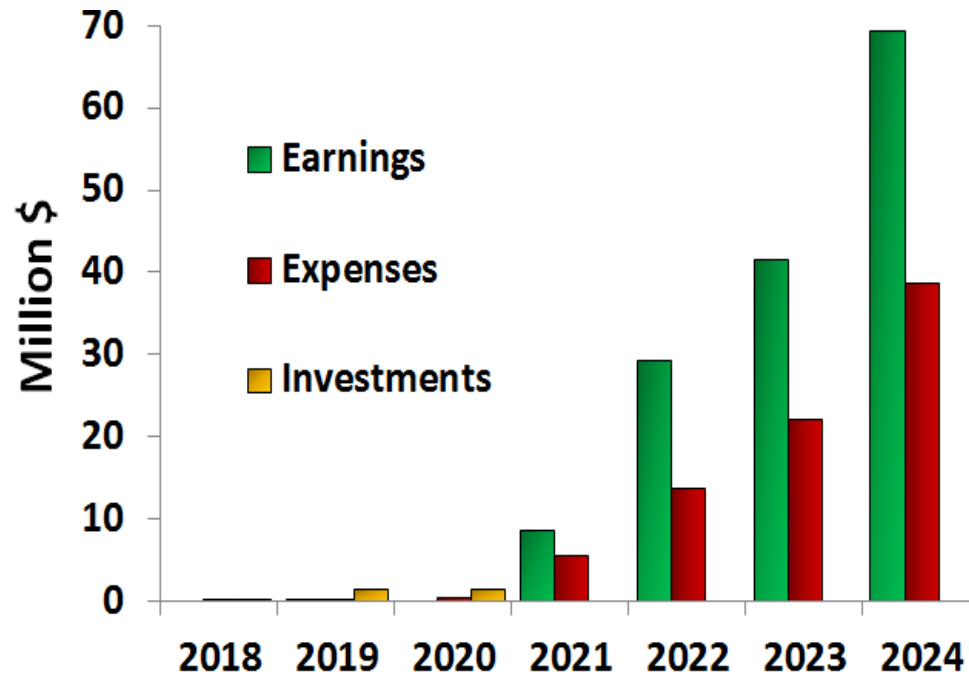
**FDA considers  
our  
technology a  
drug**

# DEVELOPMENT PLAN



# ANTIMICROBIAL PROBIOTICS

## 20 × RETURN



Sales commence in 2021

Sell 1lb of antimicrobial probiotic per ton of animal feed

Cost at \$0.04 per bird

GMP manufacturing

\$70M in sales by 2024

	2021	2022	2023	2024
EBITDA, \$ Million	0.9	8.3	15.3	25.5