



iGEM NCKU

MenTAUR

A new technique to modulate stress level



Chronic Stress-Induced Depression

The feeling of isolation increase from the economical impact brought by the pandemic

Many people are reluctant to seek medical help



World population 7.7 billion people

Over 350 million of people suffer from depression

Privilege of Chronic Stress-Induced Depression

2017
3.44%

COVID19 pandemic

x7

2020
25%

Everyone can order a cup of bubble tea that makes people happy



MenTAUR Idea

We develop functional food
for stressed people

MenTAUR Bubble

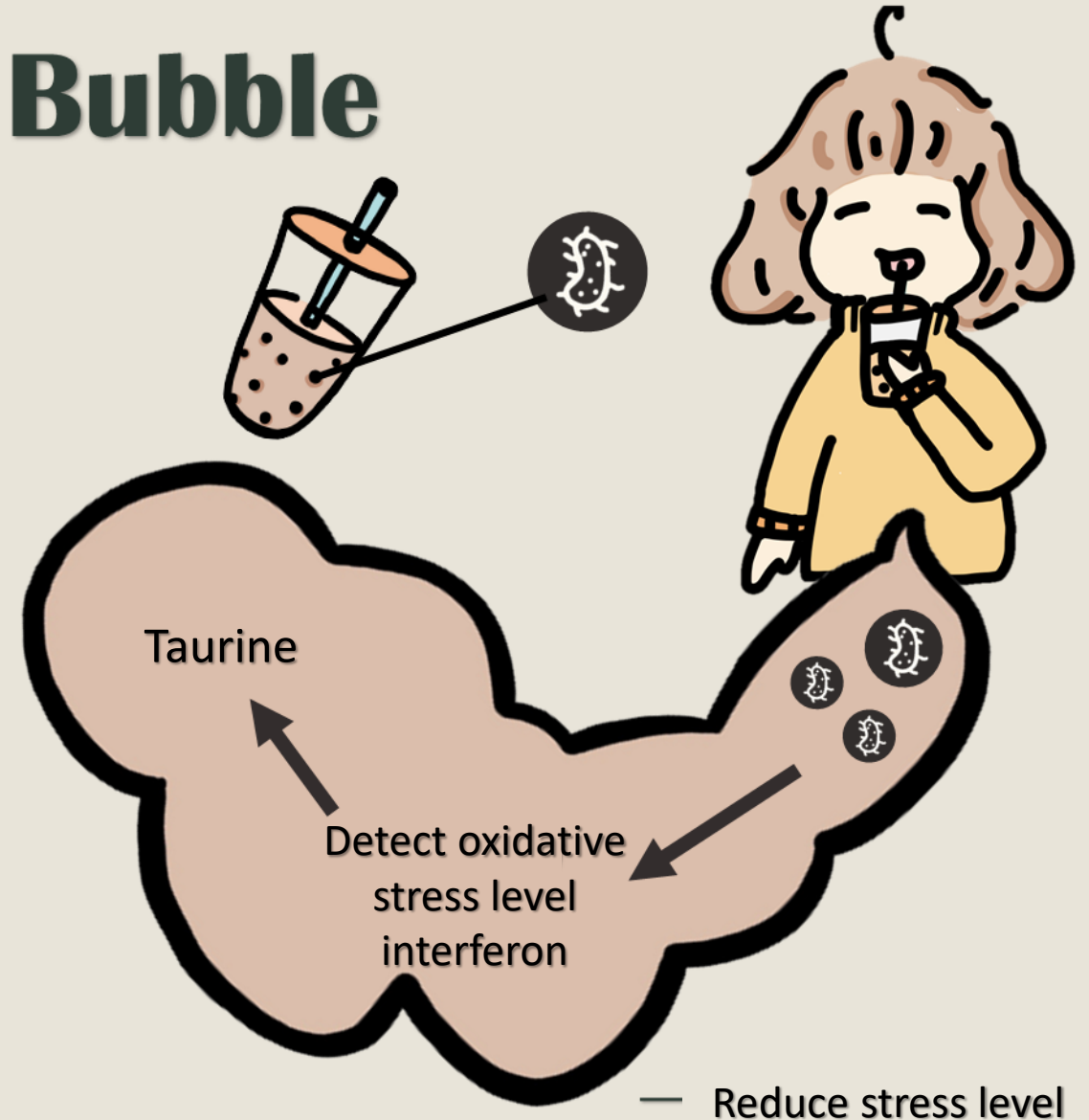


Alleviate the chance of
suffering from stress-
induced depression

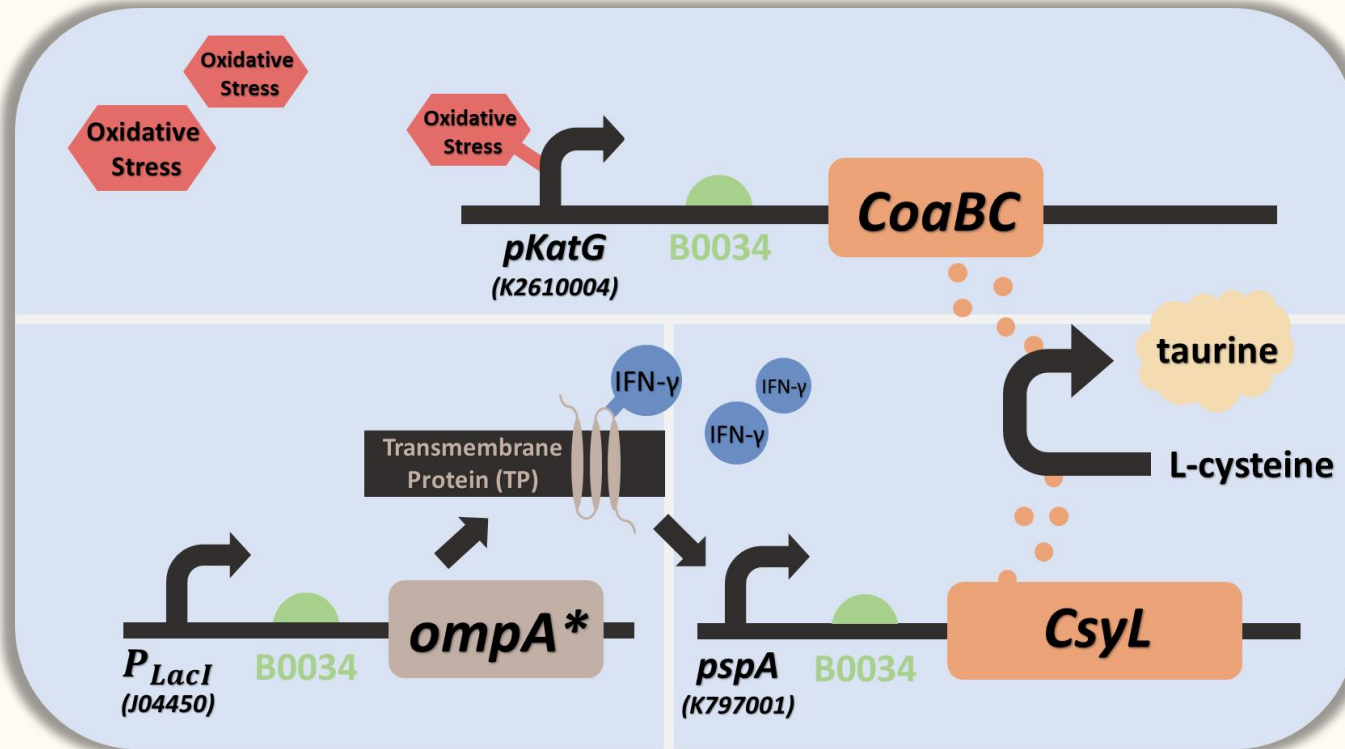
Product Characteristics

- ✓ Use of synthetic biology
- ✓ Allow bacteria to adjust the release of taurine according to individuals
- ✓ A clear market segmentation from general functional foods

MenTAUR Bubble



Personalized dual pressure detection system



Patent application : US and ROC

Detection signals:

Oxidative Stress

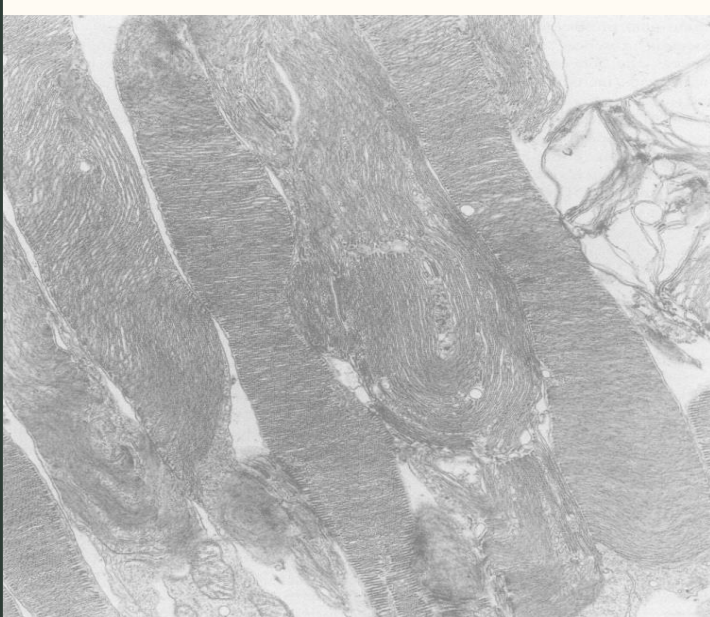
IFN-γ

The figure on the left shows the gene module design. When the target signal is detected, two enzymes production are initiated and convert cysteine in the intestines to **taurine**.

- 1 Detect specific factors
 - 2 Activate taurine production
 - 3 Manufacture of bacteria powders
 - 4 Taurine maintains homeostasis
- Release stress**

Key ingredient-Taurine's potential for animal health

Retina degradation



Damaged cone and rod cells due to lack of taurine

Protect **dim light vision**
ability of pets
Slow down the development of
retinopathy

Hayes K, Carey R, Schmidt S. Retinal degeneration associated with taurine deficiency in the cat. *Science*. 1975;188(4191):949-951. doi:10.1126/science.1138364

Maintain proper production of bile salts

Concentration of taurine in various tissues of cats fed the casein diet or the casein diet supplemented with taurine

Tissue	Casein	Casein + Taurine
<i>μmole/g wet wt.</i>		
Liver	0.21±0.03	18.87±5.08
Heart	1.18±0.18	17.57±2.08
Gastrocnemius muscle	1.54±0.29	7.42±0.95
Retina	17.88±2.03	32.10±3.46
Occipital lobe	0.29±0.05	2.90±0.20
Cerebellum	0.45±0.06	4.30±0.22
<i>μmole/ml</i>		
Plasma	<0.01	0.11±0.02
Urine	0.06±0.03	11.02±2.48

Proportion of taurine in pet foods is lacking

Allow pets to **metabolize lipids**
Maintain **normal bile acid concentration** in blood

Knopf K, Sturman JA, Armstrong M, Hayes KC. Taurine: An Essential Nutrient for the Cat. *The Journal of Nutrition*. 1978;108(5):773-778. doi:10.1093/jn/108.5.773

Normal brain development

- ✓ Increase the number of sodium and potassium pumps in cerebral cortex cells in early stages development
- ✓ Promote limbic system development that that control memory productions
- ✓ Anti-depressive effect

Chapman GE, Greenwood CE. Taurine in nutrition and brain development. *Nutrition Research*. 1988;8(8):955-968. doi:10.1016/s0271-5317(88)80135-0

Experiments prove the anti-stress effect of taurine on rats

Rat Anti-Stress Experiment

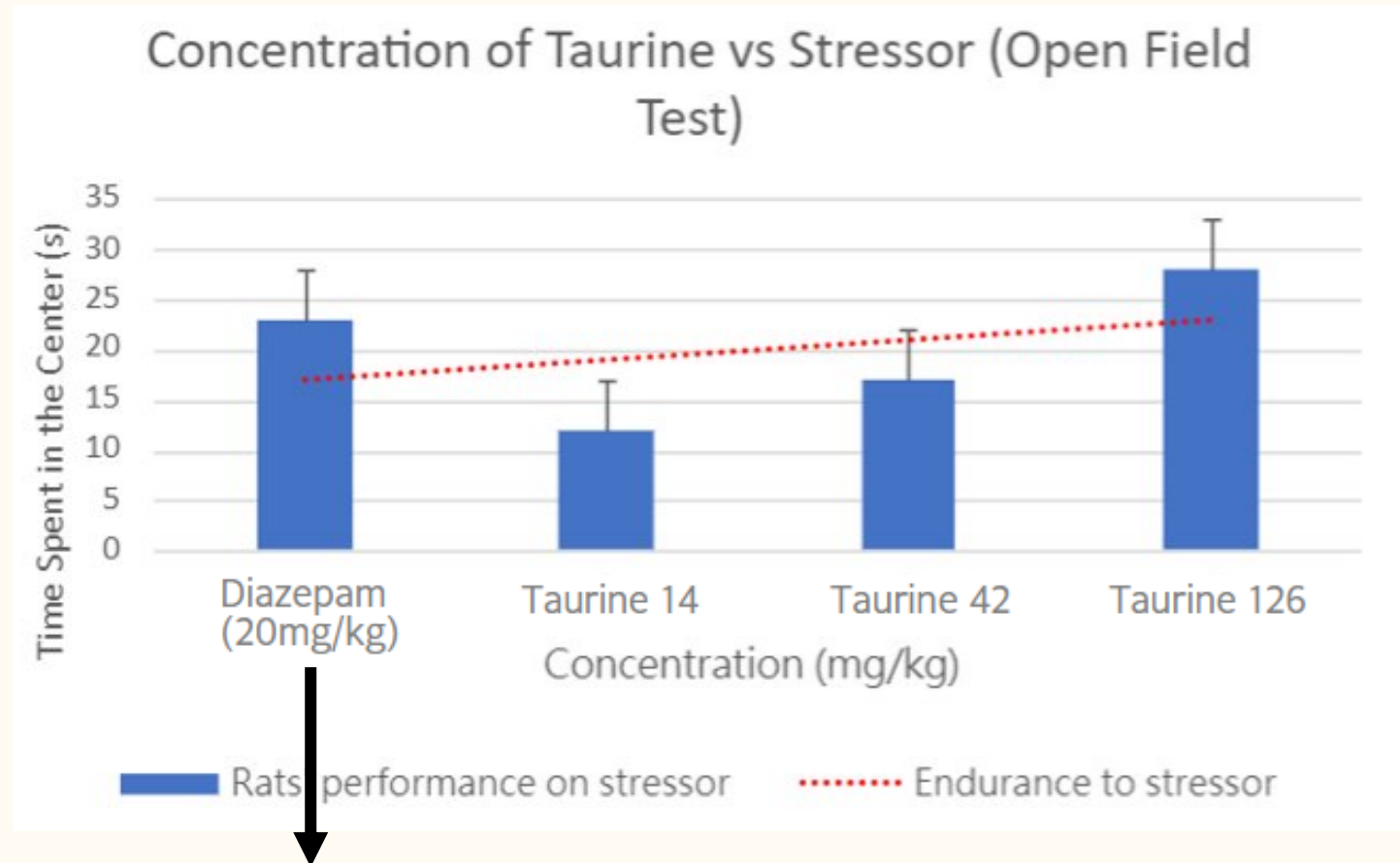
Higher Taurine Concentration



Higher Rat Anti-Stress Ability



The curative effect is enough to
produce health supplemental food
It can be applied to pet food and human
clinical trials in the future

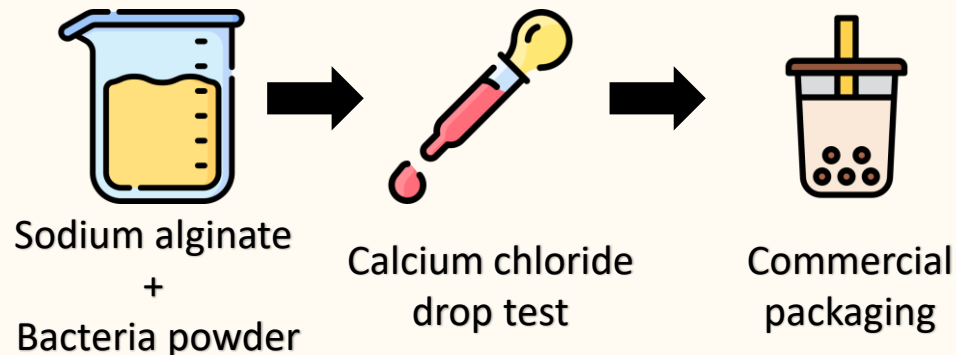
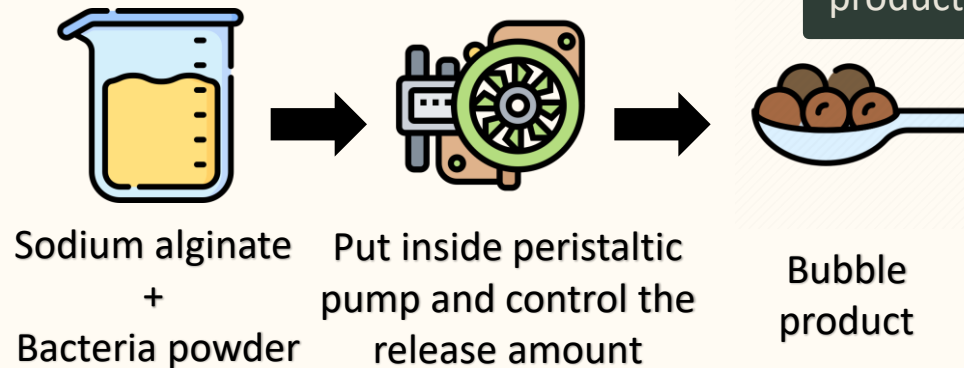


Control group: Diazepam
(Current anxiety medication drugs)

Business Model: Special Bubble

Bubble-formed product for mild depression market

Lyophilize the probiotics to form powder and add it to the product



Early market revenue down for negotiation



MenTAUR

2nd Business

Research and develop health food for pets

MenTAUR Bubble for Pets



Increase both the pet and its owner's life quality

Product Features

- ✓ Using synthetic biology
- ✓ Adjust the taurine's release based on the pet's psychological condition
- ✓ Preventing aging, depression, and retinal degradation

MenTAUR Bubble for Pets



Common pet health problems during growth and aging

Few veterinary resources
High medical expenses
Heavy life burden for pet owners
High cost



Deterioration
Unwilling to consume medicine
Irreversible injury

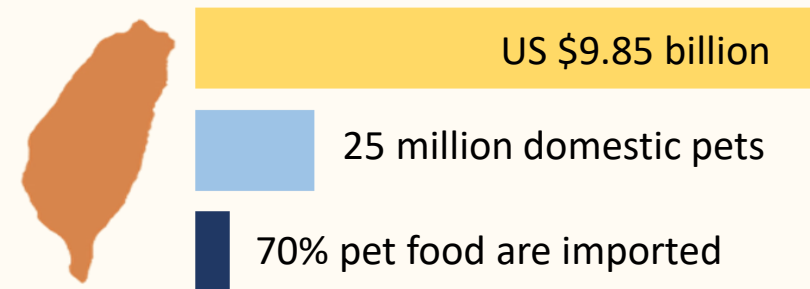
Improve life quality of pet
Reduce economic burden and
time cost of owner

Pet health supplement market scope

World



Taiwan

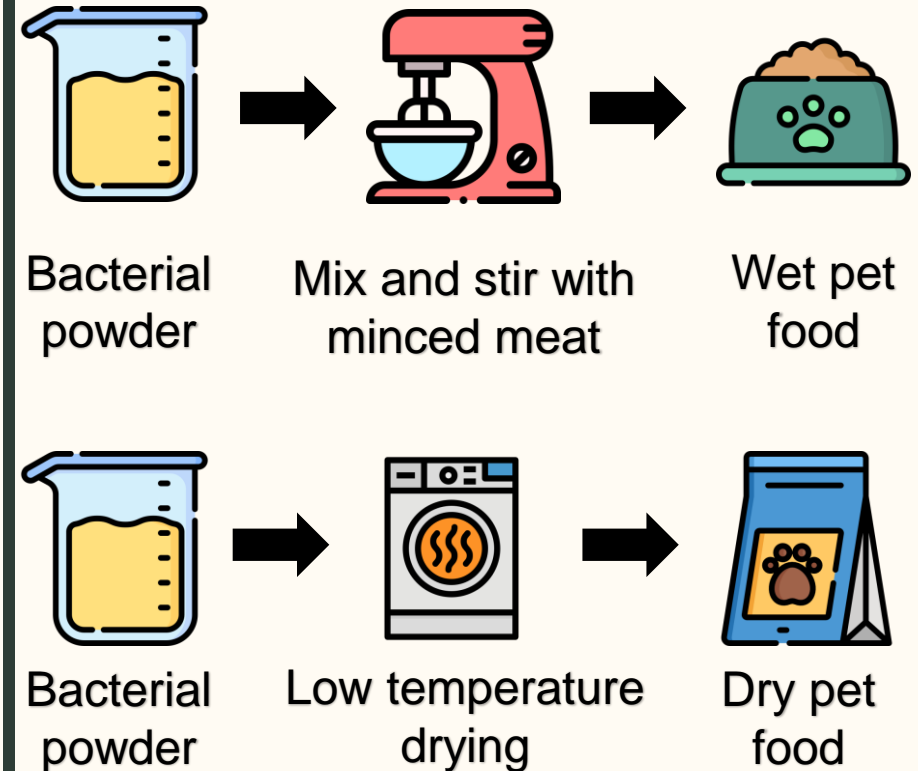


NTD \$2.01 billion in medical costs

Advantage of Pet health food

- ✓ Loose pet food regulations in Taiwan
- ✓ The **gross profit of pet products can reach 90%**
- ✓ Animal clinical effects are tested for the third-generation products
- ✓ Assist in the development of human products

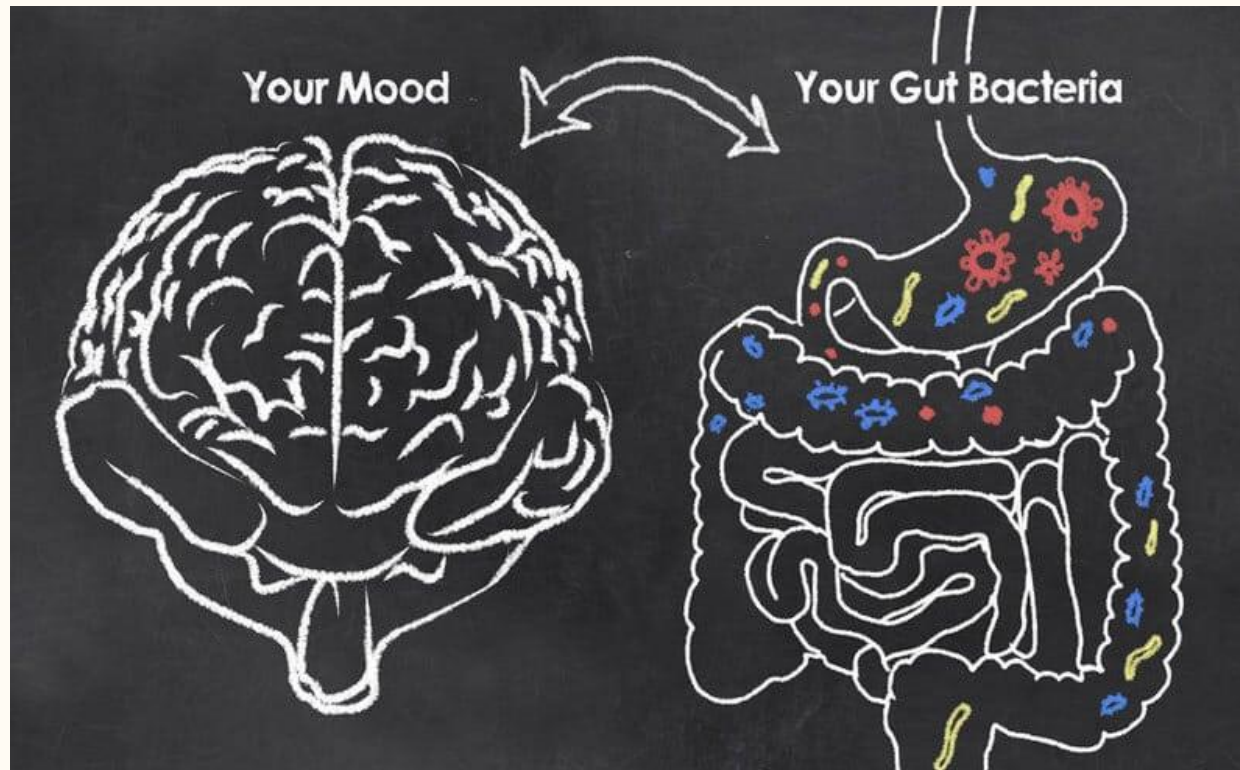
Lyophilize the bacterial liquid
--> form of bacterial powder
--> add to the product



Adjustment of taurine production according to the body's own stress factor concentration

Launch probiotic products that regulate stress factors by the use of gut–brain axis system

Application for
“DOH Health Food Regulation”



MenTAUR
Advantage

- ✓ Vast probiotics market
- ✓ Realize personalized health care

MenTAUR Marketing Model

Generation 1 (G1)



Generation 2 (G2)



Generation 3 (G3)



Overall sales channel form

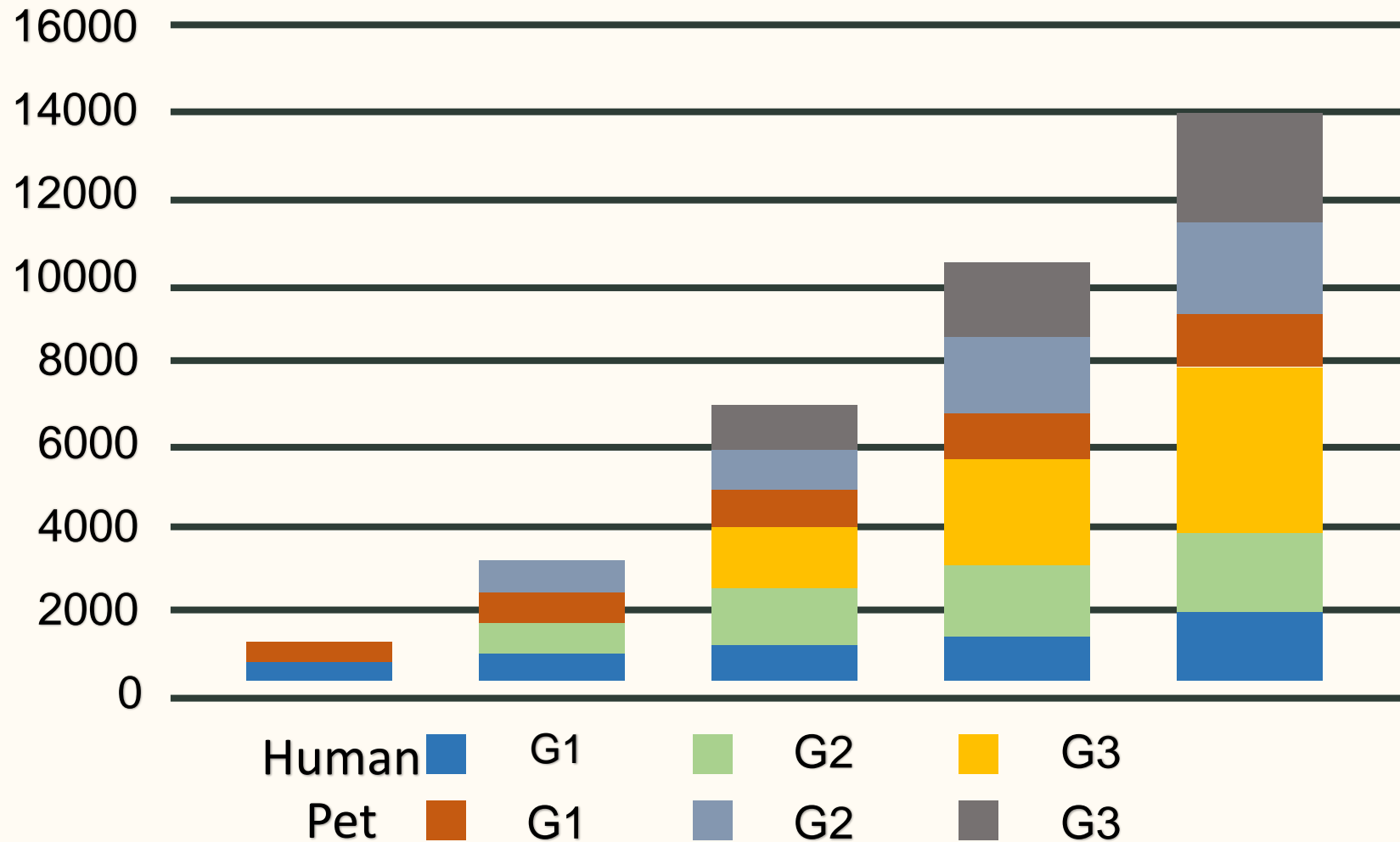
Pet	<ul style="list-style-type: none"> ✓ Pet store ✓ E-commerce
Human	<ul style="list-style-type: none"> ✓ Vendor/Pharmacy ✓ Health organization

Diversified sales channels
fits the characteristics of all
generations of products

MenTAUR Estimated Revenue

(NTD million)

Revenue Growth



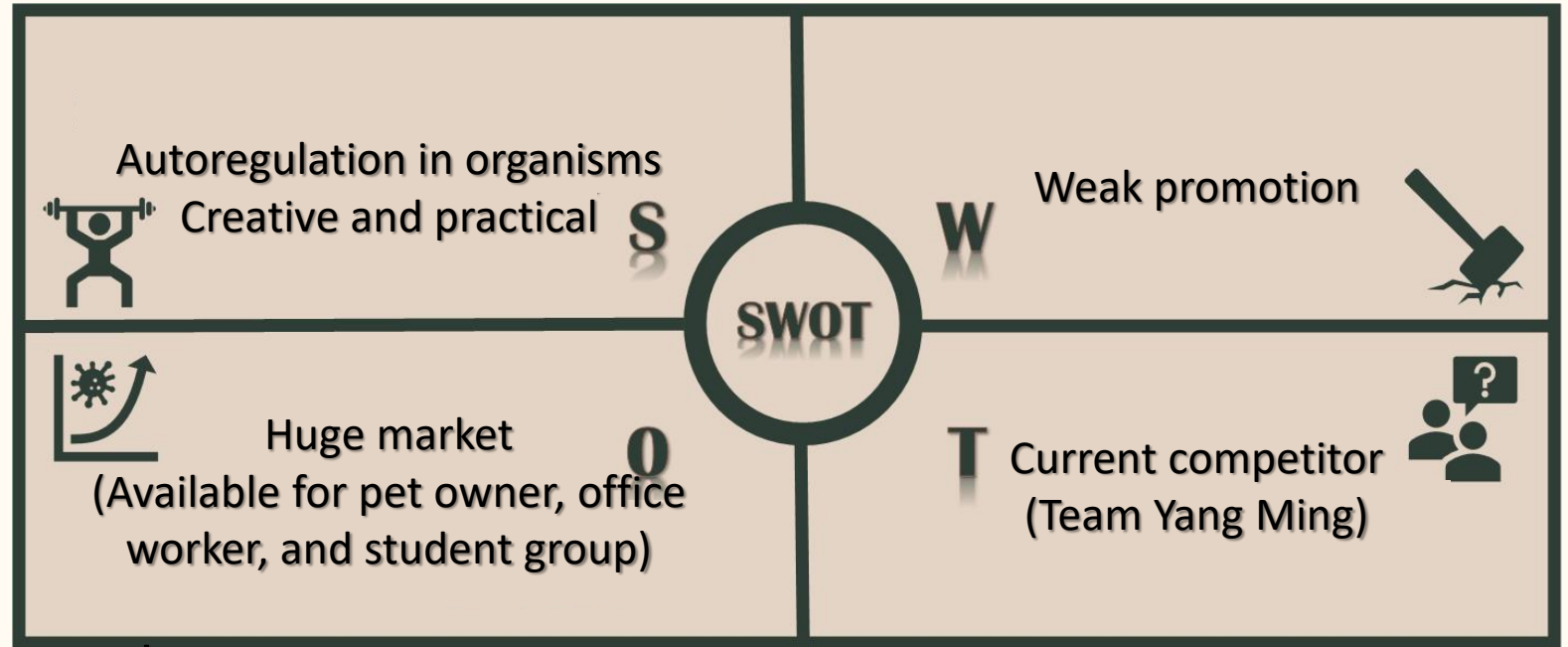
- ✓ The estimated revenue has a huge growth potential
- ✓ The gross profit margin of the three generations of products could have risen steadily
- ✓ It will become a market advantage product

Product revenue growth

Launch of three generations of product could guarantee a continuous revenue momentum

The first-generation pet health food brings:
An immediate high stable income

SWOT



Related functional foods on the market

Products currently on the market		Product defect
Pet	Human	<ul style="list-style-type: none"> ✗ No specific adjustment system ✗ High unit price ✗ Unable to integrate into life ✗ It needs to be taken deliberately
Lysine Lutein fish oil	Tryptophan Vitamin B Fish oil	

Well-known domestic food grade probiotics production plant



合作備忘錄 MOU

立備忘錄人：
益學生技 (以下簡稱甲方)
金隆生技股份有限公司 (以下簡稱乙方)

雙方茲為現有之成果及未來相關合作事宜，特議定本合作備忘錄(以下稱本備忘錄)，以資遵循。

第1條：合作緣起
金隆生技股份有限公司 (乙方) 協同 益學生技 (甲方) 欲參加 FITI 創新創業激勵計畫(以下簡稱合作計畫)，將基於乙方的原生資料及領域知識，進行具有學術及產業價值之協同合作，同時活絡資料使用，雙方同意簽訂本備忘錄。

第2條：合作內容 甲方同意在合作計畫通過後，提供甲方因營運或提供服務等過程所收集或產製的原生資料予 乙方在合作計畫的範圍內進行運用。

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 一、本條所稱之「機密資訊」係指：揭露資訊之一方(揭露方)明文標示或經口頭指定為機密，或於各種情況下應當認定為機密資訊之各類資訊、文件或物品(包括但不限於基於本合作事宜由乙方向所揭露之軟體、雙方討論之合作內容、合作條件以及所取得或持有參與成員要求保密之所有資料與資訊。)
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 三、揭露方向接受方揭露之「機密資訊」，其所有權、專利權、著作權、營業秘密或技術秘密(KNOW-HOW)係揭露方或其原授權人所有，接受方不得據為己有而申請專利權、著作權或其他智慧財產權，或使第三人申請前述權利。
 四、接受方成員因可歸責於己之事由，違反本條款之規定致揭露方有損害者，收受方應負賠償責任。
 五、本條義務於本備忘錄屆期或終止後仍然有效，且接受方應依揭露方之要求銷毀或返還機密文件、物品、設備，不留存任何備份。

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 一、雙方除另有書面同意外，不因本合作關係而當然授權或讓與任何專利權、著作權、商標、營業秘密、技術秘密(KNOW-HOW)、其他智慧財產權或其他財產權予他方。

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第5條：效力 本備忘錄之有效期間自簽訂之日起生效，除因第六條終止本備忘錄外，於生效日起三個月內，若合作計畫未通過或雙方未議定正式合約，本備忘錄即失其效力，若合作計畫通過，本備忘錄在合作計畫終止後十五日後失其效力。

第6條：終止 任一方擬終止本備忘錄，應於十五日前以書面通知他方，惟本備忘錄終止後，並不影響第三條與第四條之效力。

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第8條：爭議解決方式 本備忘錄未定事宜，雙方應本誠信原則及商業習慣共同協議解決，若仍有未盡事宜，依中華民國法律處理之。如因本備忘錄爭議涉訟時，應以台灣台北地方法院為第一審管轄法院。

第9條：附則 本備忘錄一式二份，由雙方各執正本一份。

立備忘錄人
 甲方 計畫主持人：蔡明達 (簽名或蓋章)
 聯絡電話：02-26511891
 地址：台南市東區大學路1號

乙方 代表人：金隆生技股份有限公司 張瑞仁 (請蓋公司章)
 地址：115 台北市南港區新莊路2段90號
 聯絡人：張瑞仁
 聯絡電話：02-26511891#24

中 華

Consultant

Dr. Lance

CEO of TWBIO

National Innovation Award

FITI Entrepreneurship
Excellence Award

Was invited by NASA
for presentation



[Mentaur, your life mentor]

Pet



Taurine Powder

- ✓ Advantage | Simple process
- ✓ Foundation of brand image
- ✓ Accumulated capital
- ✓ Chemical synthesized taurine

Taurine Probiotics

- ✓ Advantage | Autoregulated production
- ✓ Regulated and continuous release
- ✓ Capital expansion
- ✓ Dry/wet pet food bacteria powder

Lactobacillus Taurine

- ✓ Suitable for human and animal
- ✓ Advantage | Huge international market
Higher acceptance for lactic acid bacteria

Gen 1

Gen 2

Gen 3

Human



Taurine Powder

- ✓ Fulfill human intake standard
- ✓ Improved animal product formula

Taurine Probiotics

- ✓ Oxidative stress level detection
And interferon to catalyze the release of colonies
- ✓ Second generation pet food feature
Packaging includes bubble, probiotic powder, and capsules