

Development of Pineapple and Strawberry Flavored Dairy Product- Yoghurt



Presented By

Mahesh Gupta

Assistant Manager Project (Food Processing)
Science and Technology Entrepreneur Park
Thapar University, Patiala.

Introduction

“Let Food Be Thy Medicine & Medicine Be Thy Food”

(Hippocrates, 2500 yr ago)

➤ As per Advances in Food & Nutrition Sciences

Diet has a significant role in modulation of various functions in the body (Pajuelo,2001)

➤ **Food – means of**

- ✓ *Health*

- ✓ *Happiness*

- ✓ *Wellness*

➤ **Need of the hour**

- ✓ **Quality**

- ✓ **Health**

- ✓ **Product Diversification**

- ✓ **Value Addition**

- ✓ **Innovation**

- ✓ **Convenience**

❖ **Changes In Lifestyle, Eating Habits**

❖ **Manifold Multiplication of Health Problems**

➤ **Heart related diseases**

➤ **CVD**

➤ **CHD**

➤ **Diabetes**

➤ **Obesity**

Recent Trends

➤ **Consumer Trends**

- **Awareness**
- **Quality & longer living**

➤ **↑Consumption**

- **Low cal & high fiber foods**
- **Naturally enriched foods**
- **↑ functional foods mkt. by 60% over 1995-2000**

(Varshney, 2002)

Functional Foods

- Integral Components of Diet that Contribute Added Health Benefits
- Improves State of Health and Well-being
- Reduction in Risk of Disease

(Diplock *et al.*, 1999)

- Subject of Intense & Widespread Research

(Halsted, 2003)

➤ Major segment in functional foods

- Fermented Milks
- Prepared from milk and/or milk products by the action of specific microorganisms, which results in a reduction of the pH and coagulation

(IDF,1992)

- Wide diversity of flavors, aromas and textures, which enrich the human diet

➤ Functional Ingredients

- Poly Unsaturated Fatty Acids
- Omega 3 and Omega 6

Review of Literature

Scenario of CVD

- 30% of all deaths worldwide each year
(Bonow *et al.*,2002)

Mortality rate due to CVD

- 13.7 million in 1990
- 17 million in 1999
(WHO, 2002)
- Estimated mortality rate till 2020
 - 25 million
(WHO, 2003)

Cardiovascular Disease

Risk factors of CVD

- High blood pressure
- Abnormal blood lipid concentrations
- Diabetes
- Abdominal obesity
- Inadequate levels of physical activity
- Diets high in saturated fat

(Dewailly *et al.*, 2001)

Therapy for CVD

- **Cardiac surgeries**
- **Medicines (cholesterol lowering drugs)**
 - **Widely used**
 - Very strong
 - Drastically side effects our health
- **Modification of diet**
 - **Type of fat consumed**
 - **Replacement of saturated fat with PUFA**

PUFA

- ❖ 2 major classes
 - omega-6 and omega-3
- ❖ Principle omega-3 fatty acids
 - ✓ Alpha-linolenic acid (ALA)
 - ✓ Eicosapentanoic acid (EPA)
 - ✓ Docosahexaenoic acid (DHA)
- ❖ Sources of ALA
 - ✓ Flaxseed oil & smaller amounts in soybean & canola oils

❖ Sources of EPA & DHA

- ✓ Mainly in seafood & particularly fatty, cold-water fish

❖ Omega-6 fatty acids

- ✓ Arachidonic acid

❖ Sources of omega-6

- ✓ Corn, safflower, sunflower, soybean & cottonseed oil

Benefits of PUFA

- ❖ Provide primary prevention in low & high risk subjects of CVD
- ❖ Epidemiological & interventional studies
 - dietary PUFA reduce mortality due to CHD
(Demaison and Moreau, 2002)
- ❖ Act favorably on blood
 - ✓ Hypocholesterolemic
 - ✓ Hypotriglyceridemic
- ❖ Reduce platelet aggregation
- ❖ Exhibit antithrombotic & fibrinolytic activities
- ❖ Reduce blood viscosity
- ❖ Exhibit antiinflammatory action

➤ Ideal ratio of omega-6:omega-3

- From 3:1 to 5:1 (Simopoulos and Cleland, 2003)
- Dietary reference intake for fatty acids: 4:1
(Food and Nutrition board, 2005)

➤ Increase Intake of PUFA

- Supplementation
- Fortification of Existing Products

Fermented Milks as Carrier

Fermented milks

➤ **Raw milk** $\xrightarrow[\text{microorganisms}]{\text{enzymes}}$ **Fermented Milk**

- Distinct nutritional & sensory properties
- Preservation of milk solids in palatable form

Market Potential

- Growth of fermented milks was 6 times the rate of total dairy growth between 1998 - 2003
(Euromonitor international, 2004)
- Yoghurt was the fastest growing dairy product sector between 1998-2003

Yoghurt

Yoghurt is a fermented dairy product, obtained from the action of two thermophilic lactic acid bacteria (*Streptococcus thermophilus* and *Lactobacillus bulgaricus*) on milk

(Tamime and Robinson, 2000)

Health Benefits of Yoghurt

- **High nutritional value & refreshing taste**
- **Beneficial for health, athletics & weight control**
- **Easy to digest & high biological value**

(Bell,1993)

- **Also known to prevent some tumours**
- **Has high antimicrobial activity**

(Mcguven and Karaca, 2002)

Fortification of Fermented Milks with PUFA

- Process for manufacture of yoghurt containing unsaturated fat or vegetable oil

(Metzger, 1962)

- Manufacture of Set-type Natural Yoghurt Containing Different Oils

(Barrantes *et al.*, 1996)

- Manufacture of a set-type fermented product where milk fat was replaced by oils enriched in ω -3 PUFA

(Martín-Diana *et al.*, 2004)

OBJECTIVES

- Optimization of Processing Parameters for Manufacture of PUFA enriched yoghurt and Study its Physicochemical, Sensory & Microbiological Attributes.***
- Evaluation of Storage Stability of PUFA Enriched Yoghurt.***

Materials & Methods

❖ *Analysis of milk base*

pH, Titratable acidity, Total solids, Fat, Ash

❖ *Analysis of Yoghurt*

✓ Physiochemical tests

✓ pH, Acidity, Viscosity, Whey separation

✓ Sensory Attributes

✓ Using 9-point hedonic scale

✓ Flavor, Body & Texture, Color/ Appearance, Overall acceptability

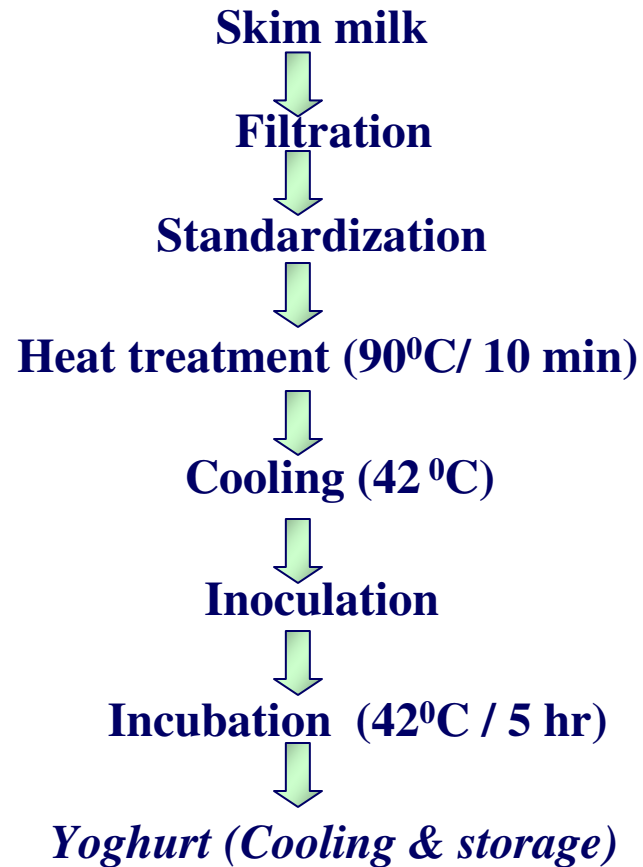
✓ Microbiological attributes

✓ Standard plate count, Total Lactic count, Yeast and mold count, Coliform count

Manufacture of low calorie PUFA enriched Yoghurt

- Receiving whole/defatted milk
- Standardization
(SNF = 12%) (Fat= 0.5%)
- Filtration / Clarification (35-40°C)
- Addition of oils (1.5%)
- Addition of stabilizer (0.1%)
- Addition of sweetener (7.5%)
- Addition of color (0.0056g/100ml for Raspberry red color)
(0.0084g/100ml for Lemon yellow color)
- Pasteurization (90°C/10min)
- Cooling (43-44°C)
- Inoculation (1.5%)
(*S. thermophilus*: *L. bulgaricus* 1:1 @ 1.5%)
- Addition of flavor (60 µl/100ml)
- Incubation (41 – 42°C/5 hrs)
- Cooling and storage (5 – 7°C)

Flow Diagram of Yoghurt Manufacture



Results & Discussion

Composition of different milk samples obtained from the market

Milk sample	pH	Acidity (%)	Fat (%)	SNF (%)	Total solids (%)
A.	7.04	0.117	4.0	7.19	12.42
B.	7.14	0.108	2.8	4.95	9.94
C.	7.22	0.126	3.3	6.55	11.76
D.	7.03	0.108	2.3	5.22	10.72
E.	7.05	0.090	2.5	4.39	9.10
F.	6.27	0.216	2.8	2.08	8.51
G.	7.30	0.117	1.6	6.21	11.22

Detection of adulterants and preservatives in different milk samples

Milk samples	Detection of formaldehyde	Detection of hydrogen peroxide	Detection of bicarbonate	Detection of cane sugar
A.	-ve	-ve	+ve	-ve
B.	-ve	-ve	-ve	+ve
C.	-ve	-ve	+ve	-ve
D.	-ve	-ve	-ve	-ve
E.	-ve	-ve	-ve	-ve
F.	-ve	-ve	-ve	-ve
G.	-ve	-ve	+ve	-ve

Characteristics of curd samples from different dairies in Patiala

Curd sample	pH	Acidity (%)	Total solids (%)	Fat (%)
A.	3.97	1.21	13.30	3.0
B.	3.99	1.08	10.66	3.4
C.	4.30	0.86	13.63	5.3
D.	4.31	0.92	11.69	4.5
E.	4.05	0.95	15.62	4.7
F.	4.22	0.92	12.77	4.0
G.	4.15	0.97	12.23	3.6
H.	4.34	0.90	11.03	4.2

Effect of different fat, culture, sugar and PUFA sources on sensory attributes of strawberry and pineapple flavored yoghurt

Attributes	Flavor	Body/Texture	Appearance	Overall acceptability
Fat Percentage				
1.5%	7.4	8.0	7.4	8.0
3.0%	7.2	6.4	7.4	7.0
4.5%	6.4	7.0	7.0	6.0
Culture Concentration				
1.0%	5.0	6.5	7.0	6.2
1.5%	6.4	7.0	7.5	7.0
2.0%	6.0	6.0	7.0	6.0
Sugar Concentration				
7.0%	6.5	6.5	7.2	6.0
7.5%	7.2	7.2	7.5	8.0
8.0%	7.5	7.2	7.5	7.5

Different PUFA Sources

1.5% R	7.7	7.2	7.7	8.0
3.0% R	6.5	7.2	7.6	7.5
1.5% G	6.1	7.1	7.4	6.2
3.0% G	5.8	6.9	7.8	5.8
1.5% F	4.25	8.0	7.8	5.0
3.0% F	4.3	7.5	7.7	5.5
1.5% S	4.6	6.0	7.5	5.3
3.0% S	3.0	5.0	7.6	6.8
1.5% SY	7.5	7.2	7.5	7.3
3.0% SY	7.0	7.5	7.5	7.0

Acceptability scores with different levels of Raspberry red color

Sr. no	Wt./50ml of milk	Acceptability (9 hedonic scale)	Wt /50ml of milk	Acceptability (9 hedonic scale)
1.	0.0030 g	7	0.0040 g	7
2.	0.0028 g	9	0.0042 g	8
3.	0.0025 g	7	0.0043 g	7
4.	0.0022 g	6	0.0045 g	6

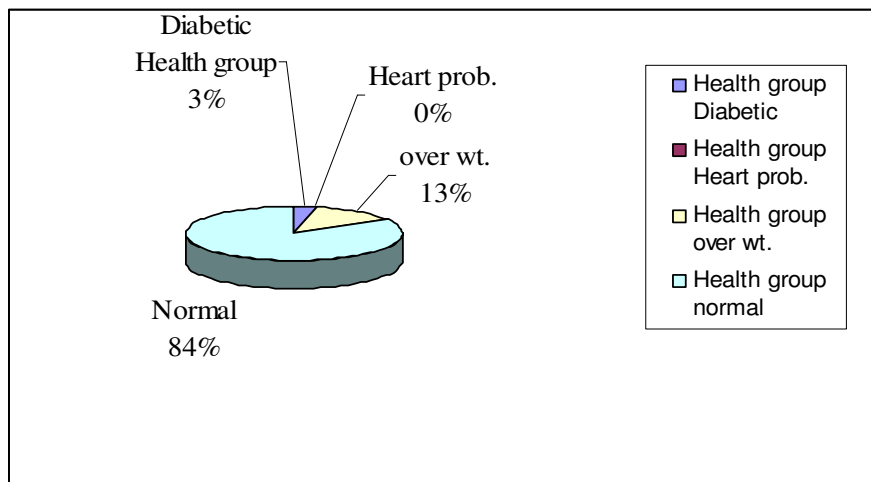
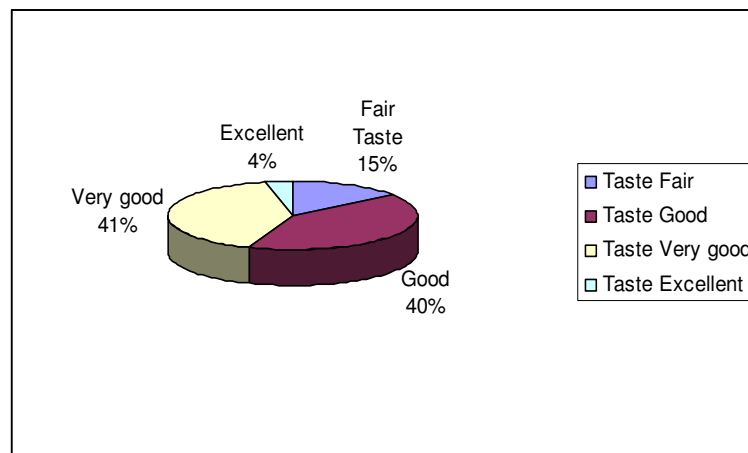
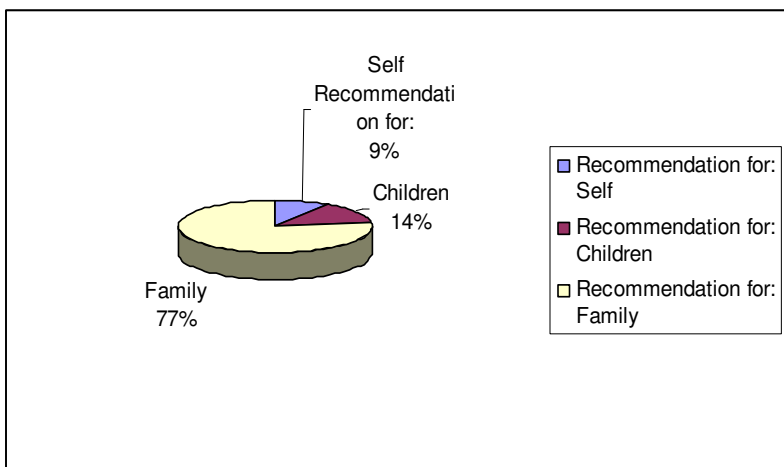
Acceptability scores with different level of Strawberry & Pineapple flavor

Sr. no	Vol. of flavor/ 50 ml of milk	Acceptability of Strawberry flavor (9 hedonic scale)	Acceptability of Pineapple flavor (9 hedonic scale)
1.	40 μ l	6	6
2.	45 μ l	6	6
3.	50 μ l	7	6
4.	60 μ l	8	8
5.	80 μ l	6	6
6.	100 μ l	5	5
7.	125 μ l	5	5
8.	150 μ l	5	4

Microbiological quality

- Initial count of lactobacilli - $6.8 \times 10^8 \text{cfu g}^{-1}$
- Total plate count - $< 100 \text{cfu g}^{-1}$
- Yeast and mould counts - $< 10 \text{cfu g}^{-1}$
- Coliform count - Nil

Consumer survey for evaluation of Strawberry flavored PUFA enriched yoghurt



Conclusion

PUFA enriched yoghurt-

- All ingredients were optimized according to evaluation by 9 hedonic scale
- Consumer's age was between 22- 45 yrs
- Normal health group

Incorporation of PUFA in yoghurt

- Doubles its health and therapeutic benefits
- It is also an important product commercially
- Emerging trend towards healthier products in India too which means companies could introduce newer products where active ingredients like omega 3 and omega 6 rich PUFA may have a role to play

CONSTRAINTS OF FPI SECTOR

- **Lack of suitable infrastructure**
- **Lack of adequate quality control & testing infrastructure**
- **Inefficient supply chain vis a vis involvement of middlemen**
- **Lack of processable varieties of farm produce**
- **Seasonality of raw material**
- **High inventory carrying cost**
- **High taxation, high packaging cost**
- **Affordability and cultural preference of fresh food**

Objectives of STEP

- To promote new entrepreneurs from amongst the S &T persons.
- To encourage and undertake development, transfer and commercialization of technologies.
- To collect, analyze and disseminate information relevant to the industries.
- To undertake consultancy and other job works and to provide human Resource Development and other services.
- To organize skill development training programmes.
- To provide the much needed services to small scale sector, which they are unable to afford individually such as library, computer services, seminar/symposia facilities, fax etc.
- To undertake R&D and other consultancy services consistent with the objectives.

Food Processing & Technology



Food technology based activities are intended to develop novel convenient foods, Cereal based premixes, fruits, vegetable blended beverages and dairy food products, while ensuring quality

systems in the food chain to ensure food

safety. Products like Instant and Therapeutic products are in the final stages of preparation, alongwith new techniques for the preservation of raw fruits and vegetables.

Saves Time

Unique Taste & Aroma

Classical Vegetable Gravy Mix

Ready to Use

Just Add Water



Promoted By: Science and Technology Entrepreneurs Park, STEP-TIET,
Thapar Institute of Engineering and Technology, Patiala - 147004

Technology Developed by STEP

- **Instant gravy mixes**
- **Therapeutic yoghurt**
- **Mushroom pickle**
- **Preserved Chapattis**
- **Shelf stable blended beverages**
- **Nutrition rich cereal premixes**
- **Murrabba**

Food Processing Facility at STEP

- Fruit and vegetable Juice Processor
- Pulverizer Grinder
- Cereal Mill
- Particle size Analyzer
- Rice Impurity Analyzer
- Dough Kneader
- Baking Oven
- Milk Testing Equipment



Mushroom Cultivation



Mushroom has received great appreciation as a quality food across the world as one of the delicacy. Globally mushroom

production has increased more than 14 folds in last 30 years. It is an export commodity and has health benefits. Mushroom cultivation using agricultural wastes is an opportunity for farmers and entrepreneurs, and plays an important role in managing organic farm wastes.



Nurturing innovations to commercial ventures



Mahesh Gupta
STEP –Thapar University,Patiala
Email:-sendtomahesh@gmail.com
Phone;- 0175-2393602, 9888563952

Thank You