



# MAINTAINING TASTE & FLAVOR WHILE REFORMULATING BAKERY PRODUCTS

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# REFORMULATION OF BAKERY PRODUCTS

The Process of Altering the Composition of a Bakery Product to Improve its Nutritional Profile or to Reduce its Content of any Ingredient of Concern to health.

Thus, Reformulation is an Opportunity to provide to the consumers, Products with improved nutritional composition, without compromising on Quality attributes.

# CHALLENGES

## Maintaining Sensory Quality

- The product should taste and feel like the original wrt mouthfeel, softness, aroma and colour

## Replacement of Functional Ingredients

- To find suitable substitutes, for ingredients like Sugar, Salt & Fat, which performs similarly in dough and provide similar texture

## Maintaining Nutritional Values

- Maintain the nutritional profile of the original

# BAKERY INDUSTRY SCENARIO-INDIA

Bakery Industry is the Largest Food Industry in India

Units both in Organised & Unorganised Sectors ( more units)

- Breads & Buns – Nearly 50% of the Prodn Vol-per capita consmn 2.5 kg/yr
- Biscuits / Cookies – Higher reach/55% in Rural consmn- per capita 2.1 kg
- Rusks- Emerged fast over last decade-per capita 0.05 kg
- Cakes & Pastries – Growing fast – per capita 0.025 kg
- Indian Flat Bread – Chapati/Phulka/Roti – incl Home made, the Largest
- per capita cons : about 80 kg/yr

# REFORMN OF BAKERY PRODUCTS- FOCUS AREAS

## Nutritional Profile

- Higher Protein content
- Higher Dietary fibre
- Immunity boosters ( particularly during & after Covid)
- Added Vitamins & Minerals
- Multigrain Breads & Speciality Breads

## Ingredients of Concern

- Reduction in Sodium
- Reduction in Fat, Saturated fat , Trans-fat
- Reduction in Added Sugar
- Egg Free, Gluten free
- Clean Label Products

# REFORMULATION FOR HIGHER PROTEIN CONTENT

- About 70 % of Indians are Deficient in Protein
- Avg Protein consumption in India is about 48 g/day Vs World 68g/day. RDA = 0.83g/kg body wt. About 5-10% deficiency
- Protein deficiency leads to Stunted Growth and Weaker Immune system
- Protein Sources for addition in Bakery Products : Defatted Soya flour, Soya/Whey Protein Conc, Pulses flour, Protein Hydrolysates, Milk Powder, Flax flour etc

# REFORMN FOR HIGHER PROTEIN CONTENT-BREAD

Normal Protein content in White Bread

7.2-7.5 %

FSSAI- Bread to be Labelled 'High' in Protein needs 10.8% plus  
( 20% RDA per 100g, 65 kg body wt)

For this, Qty of Protein Ingredient to be added  
per 100 kg Flour ( with 80 % Protein content)

Approx 10 kg

## HIGHER PROTEIN BREAD – ISSUES

- Addition of Protein Ingredients result in :
  - Coarser crumb grain of the bread
  - Open crumb structure
  - Lower loaf volume and Hardness
  - Darker crumb colour
  - Poorer taste, aroma & eating quality

# HIGHER PROTEIN BREAD –MAINTAINING TASTE & FLAVOUR

To overcome these deficiencies – changes in the Formulation :

- Addition of Vital Wheat Gluten – Approx 1% extra for every 2% addition of Protein Ingredient
  - Helps to maintain the Crumb quality, softness and Loaf Volume
- Add emulsifiers- SSL , DMG, GMS
  - improve Softness of crumb grain,
- Addition of Enzymes : Amylases, Lipase, Glucose Oxidase
  - Improves Loaf Volume, Softness & crumb stability

# HIGHER PROTEIN BREAD –MAINTAINING TASTE & FLAVOUR

Process Changes : -

- Addition of Gluten after making a Slurry & holding for 30 min
- Two Stage Dough Mixing Process with Loose sponge ( 80% Sponge) at 1<sup>st</sup> Mixing and Fermentation for about an hour
- With these modifications, products of acceptable Sensory quality could be achieved

# HIGH PROTEIN BREAD (INDIA)

*The Health Factory*<sup>®</sup> **BENEFITS**

2-3 TIMES MORE PROTEIN THAN REGULAR BREAD

*The Health Factory*<sup>®</sup> **Protein Bread**  
MULTI-PROTEIN

48g PROTEIN PER LOAF

UP TO 20% REDUCED CARBS\* | LOW FAT | LOW SUGAR

NO CHOLESTEROL

250g NET WEIGHT

HEART FRIENDLY

GOOD FOR GROWTH & RECOVERY

**MULTI-PROTEIN BREAD** **250G X 3 PACKS**

### Nutritional Facts

Serving Size - 2 Slices average 25g each

Typical Values	Per serving	Per 100 g
Energy (kcal)	133	266
Protein (g)	9.63	19.26
Carbohydrate (g)	21.66	43.31
Sugar (g)	2.05	4.09
Dietary Fiber (g)	1.00	2.00
Fat (g)	0.88	1.75
Trans Fat (g)	0.00	0.00
Saturated Fat (g)	0.37	0.73
Cholesterol (mg)	0.00	0.00

# HIGH PROTEIN BREAD – IN THE US



NUTRITION FACTS	
<b>Nutrition Facts</b>	
About 6 servings per container	
<b>Serving size</b>	<b>2 slices (90g)</b>
<b>Amount per serving</b>	
<b>Calories</b>	<b>140</b>
<b>% Daily Value*</b>	
<b>Total Fat</b> 3g	<b>5%</b>
Saturated Fat 2g	<b>11%</b>
Trans Fat 0g	
<b>Cholesterol</b> 15mg	<b>4%</b>
<b>Sodium</b> 450mg	<b>19%</b>
<b>Total Carbohydrate</b> 22g	<b>7%</b>
Dietary Fiber 20g	<b>80%</b>
Total Sugars 0g	
Includes 0g Added Sugars	<b>0%</b>
<b>Protein</b> 22g	
Vitamin D 0mcg 0%	• Calcium 470mg 45%
Iron 1mg 6%	• Potassium 140mg 4%
* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.	

# HIGH PROTEIN BISCUITS (INDIA)



# REFORMN FOR HIGHER DIETARY FIBRE CONTENT

- Normal Dietary Fibre content in White bread is low ( less than 2%)

Similarly low in other Bakery products made with Maida

- DF are Carbohydrate Polymers ( 3 or more mono units) not digested or absorbed in Intestine
- Helps to Provide Satiety ( wt mgmt.). Improve Gut Health, Bowel movement, Reduce risk of diseases like Diabetes, CVD and some types of Cancer

# REFORMN FOR HIGHER DIETARY FIBRE CONTENT

- RDA = 25 to 38 g/day ( Avg 30)
- Majority of Indians Consume less DF
- Require both Insoluble and Soluble ( approx. 25%) Dietary Fibres
- Types of DF Ingredients : Whole wheat flour, Grains, Seeds, Wheat, Apple or Soya fibre, Inulin, Psyllium powder, Gums, Resistant starch, Pectin , Banana flour, Wheat fibre etc

# HIGHER DIETARY FIBRE— IMPACT ON SENSORY QUALITY

- Addition of DF Ingredients result in :
  - Coarser crumb grain of the bread
  - Lower volume in breads & Cakes
  - Hardness in Breads & Biscuits
  - Poorer crumb colour in Bread
  - Poorer taste & eating quality

# HIGHER DF –MAINTAINING TASTE & FLAVOUR

To overcome these deficiencies :

- Addition of Vital Wheat Gluten in Bread – Helps to maintain the Crumb quality, softness and Volume
- Higher Water addition during dough mixing for Breads
- Addition of Improvers containing Enzymes
- Add emulsifiers- For Breads- SSL , GMS, DMG – For Breads- improve Softness  
For Biscuits – Lecithin, CMC, mono and di glycerides
- With these changes, products of acceptable Sensory quality could be achieved

# HIGHER DIETARY FIBRE BREADS



# HIGHER DIETARY FIBRE BISCUITS



# REFORMN FOR IMMUNITY BOOSTERS

- Contains Ingredients that Improves Immunity
- During Covid, Brands Modern & Bonn introduced Immunity Booster breads
- Contained Herbal ingredients and Jaggery
  - Black pepper, Clove, Cumin, Ginger, Turmeric, Cinnamon and Seeds
- Biscuits – Britannia, ITC- Vit A, Zn

Dr Bhadres – Contains Ashwagandha herbs, Almonds

And few other smaller brands

- Taste and Eating quality maintained by Optimising the Herbal Ingredients and by Sensory evaluation

# IMMUNITY BOOSTERS -BREADS



# IMMUNITY BOOSTERS - BISCUITS



## REFORMULATION FOR ADDED VITAMINS & MINERALS

- Normally added in small dosages and hence do not pose big challenge in Maintaining Taste & Flavour
- Supplimentation for Deficient Vit & Min such as
  - Vit A, Riboflavin, Niacin, B12, Folic acid, Iron, Zn and Cal etc
- Added quantities Do not significantly alter the Sensory attributes

# MAJOR BREADS WITH ADDED VITAMINS



Nutritional Information Per 100g	
Approx values	
Energy (kcal)	252
Protein (g)	7.2
Carbohydrate (g)	51
Added Sugar (g)	2.6
Fat (g)	2.18
Saturated Fat (g)	1.69
Polyunsaturated Fat (g)	0.01
Monounsaturated Fat (g)	0.48
Trans Fat (g)	Not detected
Cholesterol (mg)	Not detected
Vitamins*	
Vitamin A (µg)	123
Vitamin B1 (mg)	0.32
Vitamin B2 (mg)	0.26
Vitamin B3 (mg)	2.6
Folic Acid (µg)	20
Vitamin B12 (µg)	0.18
Minerals*	
Calcium (mg)	55



Nutrition Information	
per 100g product (approx..)	
Carbohydrates	51g
Sugars	3.5g
Protein	7.0
Fat	2.0
Saturated Fatty Acids	0.50
Mono Unsaturated Fatty Acids	0.70
Poly Unsaturated Fatty Acids	0.70
Trans Fatty Acids	0.0
Cholesterol	0.0
Energy	250kcal
Vitamin - B1	0.18mg
Vitamin - B3	2.4mg
Vitamin - B6	0.3mg
Vitamin - B12	0.15mcg
Folate	30mcg

# REFORMN – MULTIGRAIN /NON WHEAT CEREALS

- Normal White bread has easily digestible starch, Low Dietary Fibre and High GI
- Incorporation on Non Wheat flours- Jowar, Bajra, Oats, Corn, Bengal gram, Rice, Soya
- And Seeds – Watermelon, Sesame, Flax, Pumpkin and Muskmelon etc
- Seeds Used for incorporation as well for surface coating
- FSSAI – Min 20% Non Wheat cereals reqd in Multi grain Bread

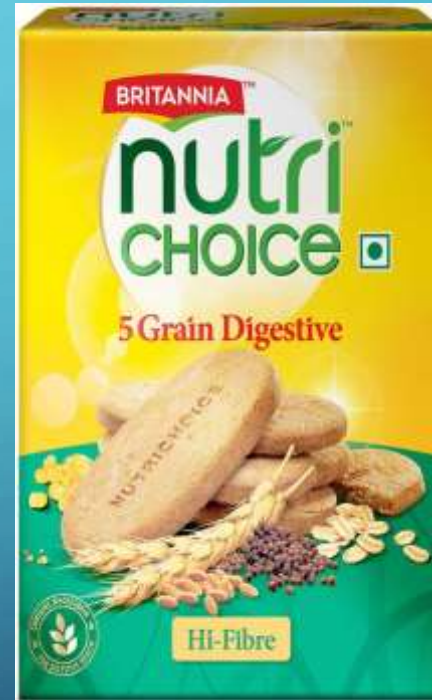
# REFORMN – MULTIGRAIN /NON WHEAT CEREALS

- Addition of Other Flours- results in dilution of Gluten and thereby quality issues
  - Lower bread Volume, Hardness, coarser crumb grain & Loss of mouthfeel
- Add Gluten, Emulsifiers, Enzymes to optimize Formulation and Sensory attributes
- Result - Non Familiar Complex Starches, Higher Dietary Fibre, Higher Protein Content, Lower GI, Richer appearance etc

# SOME MULTIGRAIN BREADS IN INDIA



# SOME MULTIGRAIN BISCUITS IN INDIA



# REFORMULATION – SPECIALITY BREADS

- Incorporation of Speciality Ingredients in Bread
- Milk, Honey, Cheese, Oats, Fruits, Bran, Protein ,Masala, Garlic , Seeds etc
- Can be Maida Or Atta based
- FSSAI – Has specified Min quantity of Speciality Ingredient to be added in  
Speciality Breads
- Require addition of Dry Gluten & Improvers to maintain Bread Quality attributes
- Result - Richer appearance, Better taste & Flavour etc

# REFORMN FOR REDUCING SODIUM CONTENT

- Salt ( Sodium Chloride) is an Essential ingredient of Bakery Products - helps in Dough development, Control rate of Fermentation, Enhancement of taste
- Important for overall sensory attributes
- Biscuits & Cakes- Sodium comes from Salt and baking powder.
- Bakery Products are major contributor to Sodium in-take, in Countries like the US, UK, Turkey
- It Causes Increase in BP and risk of Cardio -vascular diseases which is a leading cause of Deaths worldwide

# REFORMN FOR REDUCING SODIUM CONTENT

- Breads -Substitute Salt with Potassium Chloride or Cal Chloride - but to some this causes metallic or bitter taste. So Partial replacement
- Biscuits & Cakes : Use Low Sodium or Sodium free baking powder- Potassium bicarbonate etc
- Gradual reduction by Baking Industry is a good strategy

# REFORMN FOR REDUCING FAT CONTENT

- Biscuits and Cakes have Higher Fat content –Contributes to Excess Dietary Fat intake -and hence to Higher Calories Intake causing Weight gain (Obesity), Leading to Diabetes & Cardio vascular diseases

- But Fat – Provides Various Product Characteristics- Taste, Texture, Colour and Aroma

- In Cakes - Provides Fine Crumb Structure, Aeration, Tenderness, Flavour and Colour ( Maillard reaction)

And Helps to extend shelf life

In Biscuits -Retard Gluten Development to give fine Crumb

- Breads Normally have Lower Fat Percentage

# REFORMN FOR REDUCING FAT CONTENT

- Reduction in Fat – Leads to Hardness, Dryness, Loss of Taste and Mouthfeel
- Fat Replacers – Ingredients which provide functions of Fat but have Lower Calories
- Partially Replace Fat (upto 30%) in Biscuits & Cakes with
  - Complex Carbohydrates – Forms Paste with Flow Properties like Fat
    - Inulin, Plant Fibres, Rice Starch, Maltodextrin
  - Gums – Forms Gels with water with similar Texture and Viscosity like fat
  - Fruits ,Veg & Legumes – helps with Creamy texture

# REFORMN FOR REDUCING SUGAR CONTENT

- Sugar – Provides Sweetness and Various Processing & Product Characteristics
  - Provides Structure, Softness and Colour ( Maillard reaction)
  - Helps to extend microbial shelf life
  - Helps Aeration in Cakes, Control Gluten Development
- Not desirable for Diabetes (High) GI), Obesity & Cadio vascular disease

# REFORMN FOR REDUCTION IN SUGAR CONTENT

- Breads Normally have Lower Sugar Percentage , except Sweet / Milk breads
- Biscuits and Cakes have Higher Sugar content –Contributes to high sugar intake
- Reduction in Sugar – Hardness, Dryness, Loss of Taste and Mouthfeel
- Partially Replace sugar (upto 30%) with:
  - Low Sweetness Bulking Agents -Erythritol, Sucralose, Polyols, Sourdough made with selected LAB.
  - & Intensive Sweeteners- Stevia, Sucralose, Asesulfame K.

# GLUTEN FREE BAKERY PRODUCTS

Gluten provides the typical Honeycomb structure and elasticity in bread and Structure to the other Bakery Products

But Gluten may cause Allergy or Irritation in Bowel to some

About 0.5% of Indians have Celiac disease or

Non Celiac Gluten Sensitivity ( NCGS)

About 1% of the Population in Western countries &

5% in North Africa suffer from Celiac disease

# GLUTEN FREE BAKERY PRODUCTS IN INDIA

- A Few Gluten Free Breads in India, But Popular in the US
- A Number of Gluten free Biscuits brands are Available
- Made with Gluten free Cereals flour – Rice, Corn, Sorghum, Pearl-millet, Teff
- Uses Various hydrocolloids to increase viscosity and Volume – Xanthan gum, Psyllium husk powder, Guar gum, HPMC
- And Modified starches, and Emulsifiers to improve Loaf volume
- Uses enzymes – Amylase, Trans-glutanase, Protease etc

# GLUTEN FREE BAKERY PRODUCTS

Bon & Bread Gluten Free Multigrain Sliced Bread, 200 g

MRP: ₹455  
Price: ₹155 (₹0.78/g)  
You Save:  
(Inclusive of all taxes)



Gluten Free Plain Sandwich Bread (200g)

₹255.00



# REFORMN FOR EGG REPLACEMENT IN CAKES

- Egg is one of the Important Ingredient of Cakes
  - Provides Structure, Colour, Softness, Mouthfeel and Nutrition
- But Pure Vegetarians population avoid Products containing Egg
  - So also those with PKU & Egg Allergy
- Various Egg Replacers are Used- Mashed Banana, Apple Sauce, Silken Tofu, Arrowroot powder, Flax flour, Chia Flour , Whey Protein etc in combination with Various Hydrocolloids like –HPMC, CMC, Guar/Xanthan/Arabic gums And Emulsifiers like- GMS, SSL, Lecithin, Monoglycerides in Eggless cakes

# EGGLESS CAKES



# REFORMN FOR CLEAN LABEL

- Over the period of time New Ingredients to improve Product Quality are used
  - Emulsifiers, Surfactants, Crumb Softners , Dough Conditioner, Oxidising agents, pH Regulators, Yeast foods etc
- Clean Label Products are :
  - Free of Chemical Additives and Preservatives
  - with Easy to Understand Ingredients List
- For Taste & Flavour - Enzymes are used instead of Chemical additives
  - Fermented Wheat flour for shelf life

# REFORMN FOR CLEAN LABEL-SOME BREADS



# FUTURE TRENDS IN INDIA - CONCLUSION

- Consumer awareness for Protein rich, High Fibre Bakery products are increasing
- Clean Label Products are also receiving Consumer attention
- Changing Consumer Preferences trigger Reformulations of Products
- Reformulation uses New Process Techniques and Ingredients to maintain sensory quality
- Many brands are coming out with Reformulated , Good Quality New Products and meeting Consumer preferences
- They are receiving good response, though Consumers are looking for Value for money



THANK YOU