

SOURCING AND UTILIZATION OF HIGH QUALITY PROTEINS IN NIGERIAN FOOD PRODUCTS: ISSUES, CHALLENGES AND OPPORTUNITIES

Dr. Augustine E. Okoruwa MNIFST MIPAN
Group Research and Business Development Manager
Flour Mills of Nigeria Plc
2, Old Dock Road, Apapa
Lagos, Nigeria

***Invited paper presented at the USDA-Hosted Seminar
“High Quality Proteins: The Missing Link in Development?”
Protea Hotel, Ikeja, Lagos, Nigeria, March 8, 2011*

PROTEIN QUALITY: NUTRITIVE VALUE

- The quality of protein depends on the level at which it provides the nutritional amounts of essential amino acids needed for overall body health, maintenance, and growth.
- Animal proteins, such as eggs, cheese, milk, meat, and fish, are considered *high-quality*, or *complete proteins* because they provide sufficient amounts of the essential amino acids-[Isoleucine](#), [Leucine](#), [Lysine](#), [Methionine](#), [Phenylalanine](#), [Threonine](#), [Tryptophan](#), [Valine](#), [Histidine](#)
- Plant proteins, such as legume grains, corn, nuts, vegetables and fruits, are *lower-quality*, or *incomplete proteins* because many plant proteins lack one or more of the essential amino acids, or because they lack a proper balance of amino acids.
- Incomplete proteins can, however, be combined to provide all the essential amino acids to obtain the maximum nutritive value. Such combination diets generally yield a high-quality protein meal, providing sufficient amounts and proper balance of the essential amino acids needed by the body to function.

NEED FOR HIGH QUALITY PROTEIN (HQP) UTILIZATION IN NIGERIAN FOOD PRODUCTS-1

- Proteins are vital to basic cellular and body functions, including cellular regeneration and repair, tissue maintenance/regulation, hormone and enzyme production, fluid balance and the provision of energy.**
- Today, several Nigerians in rural and urban areas still live with nutritional deficiencies, especially protein & vitamins.**
- Poverty, inadequate dietary protein intake to supplement the starchy staple foods, poor governance, diseases and low priority investment in agriculture, agribusiness/agro-industry development and the social sector are major causes of malnutrition in Nigeria.**

NEED FOR HIGH QUALITY PROTEIN (HQP) UTILIZATION IN NIGERIAN FOOD PRODUCTS-2

- **Nigeria's yearly population growth will fuel the demand for high quality protein foods to combat the national scourge of malnutrition and we need to provide cost-effective solutions.**
- **The incorporation of high quality protein (HQP) sources (Tables 1&2) in Nigerian food products for improved nutritional status and wellbeing cannot be understated and must be treated as a matter of national importance.**

TABLE 1. PRIMARY SOURCES OF HQP

PLANT ORIGIN

Soybean*

Cowpea

Groundnut

Bambara nut

Pigeon pea

Beans

Quality protein Maize (QPM)

Other Plant sources

ANIMAL ORIGIN

Poultry

Fish

Eggs

Milk

Meat

Crustaceans etc

Other animal sources

-
- * The most industrialised and processed HQP source into different products for food and feed applications worldwide.

TABLE 2: HIGH PROTEIN FOODS

High Protein Food	Protein (g)
EGGS (1 medium size)	6.0
MILK (200ml)	6.7
SOYA MILK Plain (200 ml)	6.0
TOFU (soy cheese) (100 g)	8.0
LOW-FAT YOGHURT (plain) 150g	8.0
LOW-FAT YOGHURT (fruit) 150g	6.0
FISH (cod fillets 100g)	21
CHEESE (cheddar 100g)	25
ROAST BEEF (100g)	28
ROAST CHICKEN (100g)	25
OTHER MEATS AVERAGE (100g)	25

SOURCING HQPs IN NIGERIA

- **Locally as raw materials (unprocessed) from farmers and traders, open markets**
- **Locally as primary processed products-from SMEs, agro-processors, oil millers**
- **Locally as secondary processed finished products-RTC, RTE products**
- **Importation as primary processed products such as soybean flour, defatted soybean flour,**
- **Importation as derived HQP processed products : defatted soy flour, skimmed milk powder, whole milk powder, cheese, Textured Vegetable Protein (TVP), Soy Protein Concentrates (spc), Soy Protein Isolate (SPI), Soy protein Hydrolysates, Whey proteins, etc**

BENEFITS OF UTILIZING HQPs IN NIGERIAN FOOD PRODUCTS

- **Demand-driven production of HQP sources, creating greater market linkages and opportunities**
- **Improved national food security, nutrition and health.**
- **Expansion and development of the food and agro-allied industries, especially SMEs**
- **Employment generation along the agricultural value chain of HQP sources**
- **Reduction in Postharvest losses, increasing food availability and food security**
- **Economic empowerment of rural farmers, SMEs and industrial processors, marketers, etc**

SOME NIGERIAN FOOD PRODUCTS WITH HQP

- **GOLDEN MORN**
- **SOYBECA MEAL**
- **SOYADIATEC**
- **FAST-O-MEAL**
- **HYFIBA**
- **DELUXE SOYA DIET**
- **NUTREND**
- **SAUSAGE ROLLS**
- **BREAD**
- **GRANDVITA**
- **CUSTARD POWDER**
- **MEAT PIES, BURGERS**
- **ETC**

SOME NIGERIAN RTC FOOD PRODUCTS WITH HQP SOURCES-1



TABLE 3. COMMERCIAL PRODUCTS WITH HQP

S/N	PRODUCT	COMPANY NAME	ADDRESS	HQP USED
1	SOYABECA MEAL	WILLMERC (LA CUISSON) LTD	21-23, Paul Avenue. Yakoyo, Ojodu, Lagos	SOYBEAN
2	SOYADIATEC MEAL	WILLMERC (LA CUISSON) LTD	Ditto	SOYBEAN, BAMBARA NUT
4	INSTANT HYFIBA	SPECTRA IND. LTD	Ditto	SOYBEAN
5	FAST-O-MEAL	SPECTRA IND. LTD	Plot 1, Suco Rd, Oko-oba. Agege, Lagos	SOYBEAN
3	DELUXE SOYA DIET	RANKS WEST AFRICA LTD	1, Afolabi Otegbade Str, Bucknor Est. Ejigbo, Lagos	SOYBEAN, BAMABARA NUT
9	GOLDEN MORN	NESTLE NIG. PLC	23/24 Industrial Avenue. Ilupeju, Lagos	SOYBEAN
10	HOLLANDIA CUSTARD POWDER	CHI LTD	14, Chivita Av. Ajao Estate, Lagos	SMP
11	GRAND VITA	GRAND CREALS LIMITED	Km 17, Zawan R/About, Bukuru, Jos,	SOYBEAN

SOME NIGERIAN RTC FOOD PRODUCTS WITH HQP SOURCES-2



SOME NIGERIAN RTE SNACK FOODS (SAUSAGE ROLLS) WITH HQP SOURCES



PROFILE OF SELECTED NIGERIAN FOOD PRODUCTS WITH HQP: SOYABECA

- **Soyabeca Meal is a cassava flour-based food product to which micronized soybean flour has been added for protein enrichment. It can be consumed as a paste when cooked with water on fire and eaten with soup or sauce of choice or prepared as a thin or thick porridge depending on choice.**

PROFILE OF SELECTED NIGERIAN FOOD PRODUCTS ENRICHED WITH HQP: SOYABECA

NUTRITIONAL COMPOSITION (PER 100 GRAMS)

- **Moisture** **4.1%**
- **Protein** **16.0 %**
- **Fat** **6.9 %**
- **Ash** **2.4 %**
- **Crude Fibre** **3.9 %**
- **Carbohydrate** **66.7 %**
- **Energy** **393 kcal**
- **Iron** **5.2 mg**

Antinutritional factor

- *Trypsin inhibitor* **< 5 TIU/g**

SELECTED NIGERIAN FOOD PRODUCTS ENRICHED WITH HQP PROFILES: SOYADIATEC

- **Soyadiatec Meal: Made from micronized full-fat soybean flour, micronized bambara nut flour and cassava flour.**
- **It can be consumed as a paste when cooked with water on fire and eaten with soup or sauce of choice or prepared as a thin or thick porridge depending on choice.**

PROFILE SELECTED NIGERIAN FOOD PRODUCTS WITH HQP: SOYADIATEC

NUTRITIONAL COMPOSITION (PER 100 GRAMS)

- **Moisture** < 10%
- **Protein** > 25%
- **Fat** < 13%
- **Ash** < 5%
- **Crude Fibre** < 5%
- **Carbohydrate** > 45 %
- **Energy** > 390 kcal/100g

- **Antinutritional factor**
- **Trypsin inhibitor** < 5 TIU/g

UTILIZING SOYBEAN IN NIGERIAN FOOD PRODUCTS-1

- In Nigeria, several researches have been carried out on the fortification of carbohydrate-rich foods with protein-rich foods especially soybean, in order to improve their nutritional value. Examples such as soy-gari, soy-ogi, soy-kunun, Tom-Brown, soy-bread, soy-tuwo, soy-lafun, etc**
- Among cereals and other legumes, soybean has the highest protein content about 40%, whereas other legumes have 20-30% and cereals have a protein content of 8-15%.**

UTILIZING SOYBEAN IN NIGERIAN FOOD PRODUCTS-2

- **Whole soybean and soybean products have been used and accepted as food ingredients to enhance the nutritional value of Nigerian starchy foods.**
- **Soybean is a cost-efficient source of quality protein.**
- **In Nigeria, soybean is the cheapest source of protein (price per Kg protein) when compared with other major sources of protein like eggs, beef, milk and cowpea.**

SOYBEAN AS HQP SOURCE FOR UTILIZATION IN NIGERIAN FOOD PRODUCTS

SOYBEAN PRODUCTS

- **Flour-WFFSF, DFFSF, PDSF - Raw, Roasted, Extruded, drum dried, etc**
- **Defatted Cake/meal**
- **SOYA Milk**
- **TOFU-Soy cheese**
- **TVP-TEXTURIZED VEGETABLE PROTEIN**
- **SPC-SOY PROTEIN CONCENTRATE**
- **SPI- SOY PROTEIN ISOLATE**
- **SOYBEAN PROTEIN HYDROLYSATES**

**SOURCING AND UTILIZATION OF HIGH
QUALITY PROTEIN SOURCES IN
NIGERIAN PRODUCTS:**

ISSUES

ISSUES -1

- **Prices of food stuffs in Nigeria have remained higher than what obtained two or three years ago.**
- **Little or no inclusion of the food and nutrition policy into other national policies to ensure consistency of government development policies**
- **Poor integration of the organized private sector, especially SMEs in agriculture and Food Policy formulation and implementation**
- **Food insecurity caused by poor processing and storage facilities and low level of technology for agricultural production of HQP sources**

ISSUES-2

- **Technical and Economic viability of food fortification/supplementation**
- **Changing Consumer tastes and preferences**
- **Processing Equipment and Process technology requirements**
- **Raw material quality standards and specifications**

ISSUES-3

- **Finished product quality standards**
- **Food Laws/Regulatory compliance**
- **Import and export policy inconsistencies-sea, land and airport operations**
- **Government bureaucracy**
- **High cost of doing business in Nigeria-multiple taxation**

**SOURCING AND UTILIZATION OF HIGH
QUALITY PROTEIN SOURCES IN
NIGERIAN PRODUCTS:**

CHALLENGES

CHALLENGES-1

- **Non-availability of sufficient quantities of locally grown HQP sources coupled with inconsistent raw material quality**
- **High Cost of locally produced HQPs, especially of animal origin: meat, eggs, fish, poultry, full fat soybean flour and defatted soybean flour (Table 3)**
- **Difficulties in accessing Financial packages for Agribusiness and Food Processing in Nigeria, especially by SMEs the engine for economic development**

TABLE 3. SOYBEAN PRICES NAIRA/MT 2008-2010

PRODUCT	MIN	MAX
SOYBEAN GRAINS	58,000	78,000
SB Cake /SB Meal	70,000	90,000
RAW FULL FAT SOYBEAN FLOUR	120,000	150,000

Source: Personal Communication with some Soybean Processing Companies

CHALLENGES-2

- **High Cost of imported processing equipment/process technologies transformation of the basic HQP raw materials.**
- **High Cost of imported primary and secondary processed HQP products of both plant and animal origin.**
- **Low uptake and Commercialization of R&D results on HQP-fortified local foods (e.g. Soy-Ogi developed by FIRO).**

CHALLENGES-3

- **Low agricultural productivity and subsistence farming of HQPs.**
- **Fluctuating produce and product prices.**
- **Exchange rate fluctuations affecting import and export business.**

CHALLENGES-4

- **Poor post harvest handling systems- farm gate primary processing, packaging, storage/warehousing, transportation cost**
- **High overall start-up costs of food processing industries due to imported components in plant and machinery**
- **Low entrepreneurial and business management skills by prospective and existing entrepreneurs**

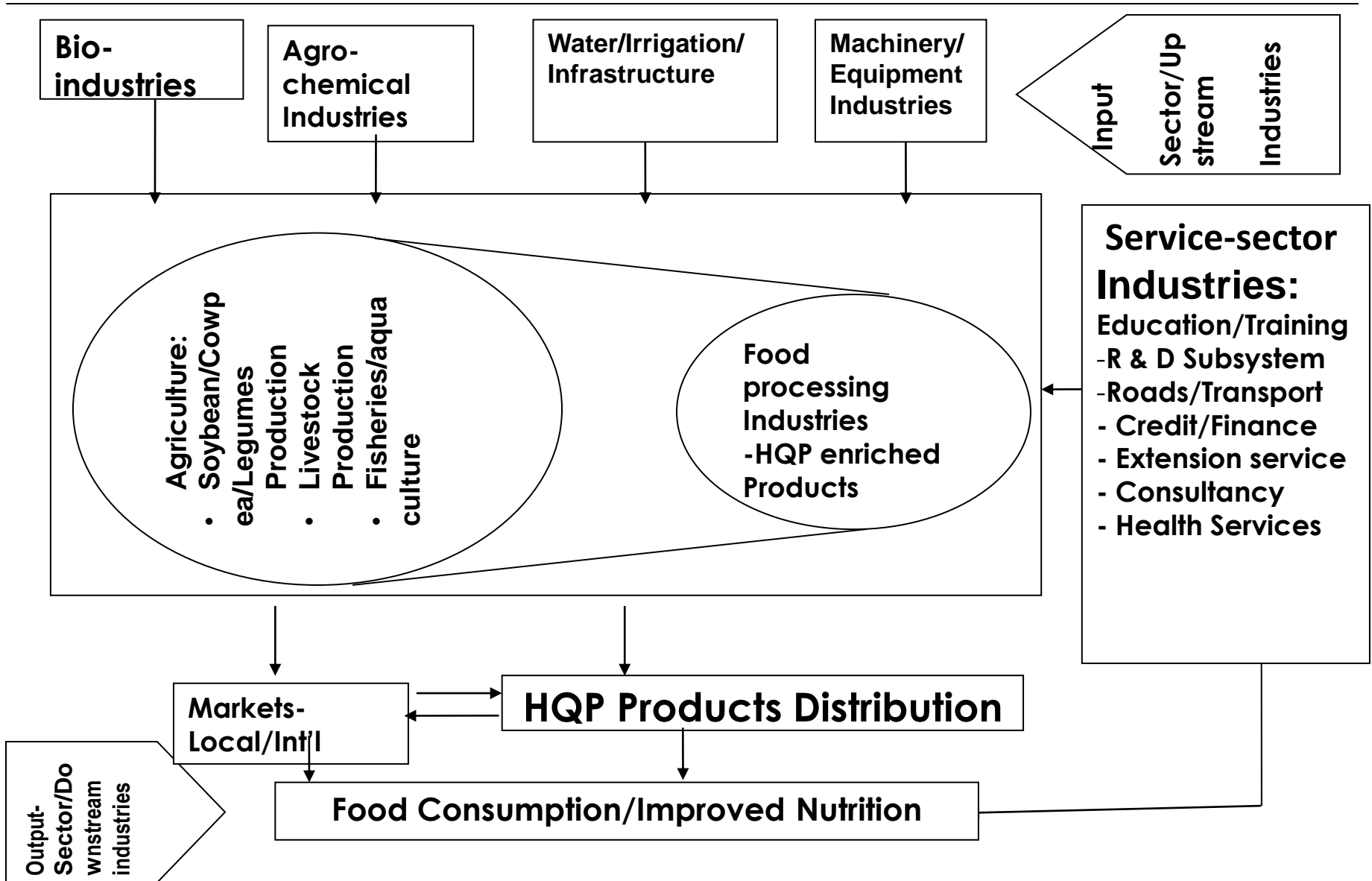
**SOURCING AND UTILIZATION OF
HIGH QUALITY PROTEIN SOURCES IN
NIGERIAN FOOD PRODUCTS:**

OPPORTUNITIES

OPPORTUNITIES-1

- **Nigeria's domestic production of both plant and animal HQP sources is far lower than demand**
- **Business opportunities exist in the agricultural value chain of HQPs production, processing and utilization (Fig.1)**

Fig 1. OPPORTUNITIES IN THE VALUE CHAIN OF HQP SOURCING/UTIL.



OPPORTUNITIES IN SOYBEAN AS HQP

- 1. Commercial production of soybean as HQP source**
- 2. Commercial processing of soybean into different products for utilization in Nigeria food products e.g. soybean flour production**
- 3. Commercial Production of Traditional soybean-enriched foods: Soy-ogi, soy-gari, soy-kunun, tom-brown**
- 4. Imitation dairy products manufacture- soymilk, ice cream, soy cheese (Tofu), milk shake**
- 5. Meat analogue production-Texturized Vegetable Protein (TVP)**
- 6. Soy Isolates, Soy protein concentrates, soy protein hydrolysates**

HQP-ENRICHED FOOD PRODUCTS MARKETING OPPORTUNITIES

- **Within Nigeria? Yes!**
- **Africa?-Yes!**
- **West Africa?-ECOWAS-Yes**
- **America?-Yes/No**
- **Europe?-Yes/No**
- **Asia?-Yes/No**

CONCLUSION-1

- **Production of the major plant and animal HQP sources in Nigeria is not sufficient and therefore only a small percentage is processed for incorporation into Nigerian food products.**
- **Of the plant HQP sources, soybean lends itself as the most industrialized crop with more derived products use in Nigerian products.**
- **Efficient agricultural production and industrial processing/utilization of HQPs in Nigeria need to be promoted, strengthened and supported by all in order to harness the full economic potentials and nutritional benefits**

CONCLUSION-2

- **Value-added HQP food products would facilitate trade within Nigeria, West Africa and other African countries, Europe and the rest of the world.**
- **There is need to link small-scale primary HQP raw materials producers to industrial scale processors.**
- **Attention must be paid to SMEs using small-scale technologies that are both efficient and produce quality products.**
- **Business opportunities exist in Nigeria in the production and post-production value chain activities of HQP sources.**