

## **IN-VITRO DIGESTIBILITY AND GLYCEMIC INDEX OF EXTRUDED SNACKS PRODUCED FROM FLOUR BLENDS**

**\*Maxwell, Y. M. O., Zubair, A. B., Femi, F. A., Jiya, M.J., Nuhu, B. S., and Awe, F.O.  
Department of Food Science & Technology, Federal University of Technology, Minna.**

\*Corresponding author's email: y.maxwell@futminna.edu.ng. Phone No: +2348067284347

**KEYWORDS:** in-vitro digestibility, extruded snacks, flour blends, protein concentrate

**KEYWORDS:** product development, under-utilized crops, protein concentrate, blends

### **BACKGROUND AND OBJECTIVES:**

Extrusion cooking is a promising technology that provides a convenient, inexpensive and efficient manufacturing process to obtain snacks (1). Development of snacks using locally under-utilized crops such as orange fleshed sweet potatoes (OFSP) and Bambara groundnut is crucial for alleviating under-nutrition among the population through food-based approach. Therefore, the study examined the in-vitro digestibility and glycemic index of extruded snacks produced from OFSP and Bambara groundnut protein concentrate.

### **MATERIALS AND METHOD:**

Raw materials were procured from Kure Ultra-Modern Market, Minna, Niger State. The OFSP was washed, peeled, sliced, sulphited by soaking in water containing sodium meta-bisulphite for 30mins, drained and solar dried for 48hrs. The dried OFSP was milled into flour as described by (Olatunde *et al.*). The bambara seeds were cleaned and then soaked in distilled water for six hours, at ambient temperature. The soaked bambara seeds were spread on jute bags and allowed to germinate for 48 hours with sprinkling of water at intervals. The germinated bambara seeds were dried using solar drier for 48 hours and then milled. The protein extraction was carried out as described by (Chandi and Sogi), with minor alterations. In-vitro starch digestibility was determined using the method of (Chung *et al.*). The analyses were conducted in triplicates and data were subjected to one-way analysis of variance.

### **RESULTS AND DISCUSSION:**

Table 1 shows all parameters measured were significantly. However, the variation in the in-vitro starch digestibility may be attributed to formation of protein starch complexes that alters starch gelatinization behaviour. The relatively high values of Slow digestible starch (SDS), Resistance starch (RS), Total glucose (TG), may be as a result of the destruction of double helix structure of

starch during extrusion. (Kamble *et al.*, 2019) Also, as the protein proportion increases, Resistance starch show a constant decrease.

**Table 1. In-vitro Starch Digestibility and Glycemic Index of Extruded Snacks**

Parameters	SZ	SY	SX	SW	SV
<b>RDS</b>	12.01±0.01 <sup>d</sup>	16.05±0.04 <sup>c</sup>	10.87±0.02 <sup>e</sup>	22.03±0.02 <sup>a</sup>	20.65±0.03 <sup>b</sup>
<b>SDS</b>	50.64±0.17 <sup>a</sup>	42.61±0.02 <sup>b</sup>	39.80±0.26 <sup>c</sup>	36.14±0.13 <sup>e</sup>	37.94±0.06 <sup>d</sup>
<b>RS</b>	6.81±0.01 <sup>a</sup>	6.22±0.01 <sup>b</sup>	5.91±0.11 <sup>c</sup>	3.95±0.14 <sup>d</sup>	3.14±0.02 <sup>e</sup>
<b>TS</b>	69.47±0.06 <sup>a</sup>	64.89±0.05 <sup>b</sup>	56.59±0.38 <sup>e</sup>	62.13±0.17 <sup>c</sup>	61.74±0.02 <sup>d</sup>
<b>TG</b>	77.19±0.04 <sup>a</sup>	72.10±0.05 <sup>b</sup>	62.88±0.42 <sup>e</sup>	69.03±0.19 <sup>c</sup>	68.60±0.02 <sup>d</sup>
<b>SDI</b>	17.21±0.01 <sup>e</sup>	24.10±0.04 <sup>c</sup>	19.21±0.10 <sup>d</sup>	35.46±0.06 <sup>a</sup>	33.44±0.70 <sup>b</sup>
<b>GI (%)</b>	57.24±0.01 <sup>e</sup>	59.54±0.01 <sup>d</sup>	59.71±0.01 <sup>c</sup>	62.31±0.01 <sup>b</sup>	63.53±0.01 <sup>a</sup>

Values are means ± standard deviation of triplicate determination. Values in the same row with different superscripts are significantly different ( $p \leq 0.05$ ).

**Keys:** Rapidly digestible starch (RDS), Slow digestible starch (SDS), Resistance starch (RS), Total starch (TS), Total glucose (TG), Starch digestibility index (SDI) and Glycemic index (GI);

SZ = 100 % Orange Flesh Sweet potato and 0 % Bambara Groundnut

SY = 95 % Orange Flesh Sweet potato and 5 % Bambara Groundnut

SX = 90 % Orange Flesh Sweet potato and 10 % Bambara Groundnut

SW = 85 % Orange Flesh Sweet potato and 15 % Bambara Groundnut

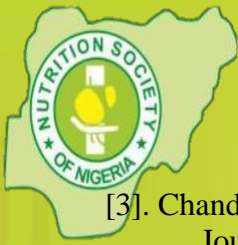
SV = 80 % Orange Flesh Sweet potato and 20 % Bambara Groundnut

## CONCLUSION AND RECOMMENDATION(S):

There were significantly difference in the in-vitro starch digestibility and glycemic index of the flour blends. It is also recommended that the flour blends storage stability should be determine.

## REFERENCES

- [1]. Dilrukshi H.N., Damir D. T., Brennan M.A., and Charles S. B. (2022). Effects of extrusion processing on the bioactive constituents, in vitro digestibility, amino acid composition, and antioxidant potential of novel gluten-free extruded snacks fortified with cowpea and whey protein concentrate. *Food Chemistry* Volume 389, 30.
- [2]. Olatunde, G. O.; Henshaw, F. O.; Idowu, M. A.; Tomlins, K. (2020). Quality Attributes of Sweet Potato Flour as Influenced by Variety, Pretreatment and Drying Method. *Food Sci. Nutr*, 4(4), 623–635. DOI: 10.1002/ fsn3.325.



[3]. Chandi, G.K. and Sogi D.S (2007). Functional properties of rice bran proteins concentrate. *Journal of Food Engineering* 79 (2): 592-597.

[4]. Chung, H.J., Q. Liu and R. Hoover, 2009. Impact of annealing and heat-moisture treatment on rapidly digestible, slowly digestible and resistant starch levels in native and gelatinized corn, pea and lentil starches. *Carbohydr. Polym.*, 75: 436-447.

# NUTRITION SOCIETY OF NIGERIA

**Central Organizing Committee  
(COC)**  
**53rd Annual General Meeting and Scientific  
Conference**

**'ABUJA 2023'**

**September 18th - 22nd, 2023**

Tel: +234 7060624024  
abstractnots@nutritionnigeria.org

Email: nsnconference@nutritionnigeria.org

**Chairperson, Central Organizing Comm.  
Nutrition Society of Nigeria**  
Dr. Florence Uchendu  
Afolabi  
Tel: +2348037065874  
+2348034750655  
Email: Uchendu\_flo@yahoo.com  
afolabiwao@yahoo.com

**Team Leader, Scientific Comm.**  
Dr. Dehinde Makanjuola  
Tel: +2347066855539  
Email: dendus12@gmail.com

**President,**  
Prof. Wasiu A.O.  
Tel:  
Email:

2023.

18th August,

Dear Maxwell, Y. M.O., *et al.*,

## LETTER OF ACCEPTANCE

We have the pleasure to inform you that your abstract titled: **“In-vitro digestibility of extruded snacks produced from flour blends of orange flesh sweet potato-bambara groundnut protein concentrate.”** (ABJ-NSN-2023-N005) by Maxwell, Y. M.O., Zubair, A. B., Femi, F. A., Jiya, M.J., Nuhu, B. S., and Awe, F.O. has been accepted for **POSTER Presentation** at the 53<sup>rd</sup> NSN Annual General Meeting and Scientific Conference scheduled to hold between 18<sup>th</sup> and 22<sup>nd</sup> September, 2023 at the NICON LUXURY, ABUJA, Tafawa Balewa Way, Central Business District, Federal Capital Territory.

The presentation guideline will be sent to you after receiving your corrected abstract.

Thank you.



**Dr. Dehinde Makanjuola**

**Uchendu**

Chairman, Scientific Committee  
Conference,



**Dr Florence Ngozi**

Chairman, Abuja 2023 NSN

COC

Vice Presidents: Dr. Wasiu A.O. Afolabi (South), Mr. Sam Yuwa (North); General Secretary: Charles C. Nkwuala; Assistant Secretary: Dr. Elizabeth Udentia; Treasurer: Amaka Okwesilieze; Financial Secretary: Dr. Hanson O. Iyawe; Publicity Secretary: Olusola A. Malomo; Internal Auditor: Alhaji Yusuf M. Gunu; Ex-Officio: Dr. Folake Samuel, Alhaja Fatima F. Amodu; Editor-in-Chief: Dr. Vivienne Ibeanu; Immediate Past President: Prof. Ngozi Nnam

**Theme:**

***"Strengthening Nutrition Leadership and Workforce  
Capacity for Improved Health and Development in Nigeria"***