Int.J.Curr.Microbiol.App.Sci (2018) *7*(5): 3802-3806

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 7 Number 05 (2018)**
Journal homepage: http://www.ijcmas.com

Short Communications https://doi.org/10.20546/ijcmas.2018.705.442

Benefit-Cost Ratio for Production Process of Extruded Products Prepared From Different Blends of Sattu and Kodo

Devendra Kumar[1]*, Shobha Rani[2] and Varsha Kumari[1]

[1]KVK, Vaishali, Bihar, India
[2]KVK, Jehanabad, Bihar, India

**Corresponding author*

Keywords

Kodo, Extruder, Sattu, Specific length, Extrusion

Article Info

Accepted:
24 April 2018
Available Online:
10 May 2018

A B S T R A C T

In the present study good quality ready to eat extrudates were prepared from a suitable blend of sattu and kodo. Kodo is millet that supply starch necessary to provide required puffing quality to extrudate. Kodo also imparts brightness to the extrudate. Sattu has been blended as it is a rich source of protein gram being the main source followed by wheat and barley. It also provides fibres. The cost analysis for preparation of extrudates by a commercial extruder (with a production capacity of 1500000 packets of 20 grams) of ready to eat extruded snacks of blended flour consisting of blend of sattu and kodo flour in the proportion of 40:60 indicates the break even quantity of 1595769 units, the break even sales of Rs 9574614 and break even period of 260 days. Thus the unit can be economically able if product could be sold @ Rs 6/unit of 20 g.

Introduction

The concept of extrusion cooking has potential to become one of the most promising frontier technologies suitable to prepare good quality engineered food products. Although snack foods were among the first commercially successful extruded foods, today extruders produce many foods of nutritional importance. The ability of extruders to blends diverse ingredients in novel foods can also be exploited in the developing functional foods market. Functional ingredients such as sattu (mixture of roasted gram powder, wheat powder and barley powder in the ratio of 80:10:10) has been taken Extrusion aims at producing a voluminous, expanded, crispy product resembling a baked product. There is no principal limitation in terms of the raw materials, which can be used for extrusion. Simple single-screw extrusion is relatively more versatile, inexpensive and easy to maintain processes, which can be applied to

take advantage of indigenous crops such as cereals, millets and pulses crops. Anti-nutritive compounds can be reduced during extrusion to provide safer and more nutritious foods (Harper 1981). Anti-nutritive compounds can be reduced during extrusion to provide safer and more nutritious foods (Harper, 1981). Using extrusion cooking technology good blend ratios optimum machine and process parameters can be identified to fortify the kodo with sattu (mixture of roasted gram wheat and barley powder in the ratio of 80:10:10 for ready to eat extruded snacks).

Extrusion is the process of pumping thick viscous liquid. The device used for the process is known as extruder. Extruder is a cooker where pasty, semisolid materials may be cooked, mixed and/or concentrated. This is a type of heat exchanger that is common for producing sweetmeat, ready to eat cereals etc. A screw type device is commonly used for extrusion.

Extrusion cooking combines the heating of food raw material with the act of extrusion to create a cooked and shaped food product. Cooking of food ingredients during the extrusion process results in the gelatinization of starch, denaturation of protein, inactivation of many raw food enzymes responsible for food deterioration during storage, the destruction of naturally occurring toxic substances such as trypsin inhibitors in soybeans, and the diminishing of microbial counts in the final product.

Materials and Methods

The experiments were carried out to find out the effect of different levels of processing parameters namely moisture contents of feed (8, 10, 12, 14 and 16%), blend ratios i.e. sattu: kodo (70:30, 60:40, 50:50, 40:60 and 30:70), the proportion of roasted gram, wheat, barley powder in a constant proportion i.e. 80:10:10. The machine parameters that were varied to get the appropriate temperature (160, 170, 180, 190 and 200°C) and screw speed (70, 90, 110, 130 and 150 rpm) on physical properties like expansion ratios, bulk density and textural properties namely hardness, crispness, and cutting strength of extrudates and biochemical properties like protein, carbohydrates, fat, fibre, calcium and iron content of extrudates.

Results and Discussion

The results obtained were analysed by Response Surface Methodology RSM, using Central Composite Rotatable Design (CCRD) with five independent variables and five levels of each.

The experiment was planned and conducted to characterize the machine parameters namely screw speed, barrel temperature, and die head temperature and feed parameters namely moisture content and ratio of different blends of two materials namely sattu and kodo identified for preparation of ready to each extruded snack.

The response surfaces generated for (i) physical properties i.e. mass flow rate of extrudate and moisture content of extrudate, (ii) expansion ratios, namely, sectional expansion index and water absorption index, (iii) gravimetric properties like specific length and bulk density of extrudates, and (iv) biochemical properties like protein, carbohydrates, fat, fibre, calcium and iron the (v) textural properties, i.e. crispness, hardness and cutting strength.

Break even analysis

Cost analysis for preparation of ready to eat extruded snacks from the identified best blended flour of Sattu and Kodo powder in the blend ratio of 40:60.

Fixed Cost:

Cost of machines and equipments:

Sl. No.	**Machine/Equipment**	**Cost in Rupees**
1	Food Extruder with accessories	20,00,000=00
2	Hammer Mill	40,000=00
3	Burr Grinder	40,000=00
4	Automatic Pouch Packaging Machine (3 no. @ Rs. 13,00,000 each)	39,00,000=00
5	Weighing Balance	30,000=00
6	Moisture Tester	50,000=00
7	Furniture	50,000=00
8	Containers for raw materials and finished product.	50,000=00
9	Crates	25,000=00
10	**Total**	**63,85,000=00**

Cost of land and Building:

Sl. No.	*Item*	**Cost in Rupees**
1	Land area 600 sq. ft. (300+300 Sq. ft.) @ Rs. 300 per sq. ft.	1,80,000=00
2	Construction cost @ Rs. 1000 per sq.ft.	6,00,000=00
3	**Total**	**7,80,000=00**

Total Fixed Cost = 63,85,000=00 + 7,80,000=00
= **71,65,000=00**

Fixed cost per month:

Assumptions:

Useful life of machines = 10 years.
useful life of building = 20 years.
Salvage Value = 10% of Initial cost.
Rate of interest = 12% p.a.

1. Depreciation of machines per year = (71,65,000 – 716500)/10
= 4,44,850.00
2. Cost of Land and building per year = (7,80,000.00)/20
= 39,000.00
3. Fixed cost = 30,000.00 + 4,44,850.00
= 6,83,850.00
4. Interest @ 12% per year = (6,83,850.00 x 12)/100
= 82,062.00
5. Total Fixed Cost = 6,83,850.00 + 82,062.00
= 7,65,912.00 per year.

Variable Cost:

Sl. No.	*Items*	**Cost in Rupees.**
1	Labour Charges: 1. Manager/Supervisor 1 no. @ Rs. 15000/- p.m. 2. Operator @ Rs. 8,000/- p.m. 3. Helper @ Rs. 4000/- p.m. 4. Chowkidar @ Rs. 3000/- p.m.	30,000=00 p.m.
2	Electricity charges for 500 kW in a month	30,000=00 p.m.
3	Raw Materials required per month: 1. Gram (30,000 kg. x 0.80 part x @ Rs. 30 per kg.) = 7,20,000=00 2. Wheat (30,000 kg. x 0.10 part x @ Rs. 13 per kg.) =39,000=00 3. Barley (30,000 x 0.10 part x @ Rs.24 per kg.) = 72,000=00	8,31,000=00
4	Spices @ 2 % @ Rs.400 per kg.	2,40,000=00
5	Packaging material@ 0.25 per pcs. (15,00,000 x 0.25)	3,75,000=00
6	Repair and Maintenance @ 10% of Machine cost.	2,22,000=00
7	Insurance charges @ 10% of TFC	27,975=00
	Total	**16,95,975=00**

Assumptions:

Capacity	= 100 kg raw materials per hour.
Operating Time	= 10 hours / day.
Working days	= 26 days in a month.
Total installed capacity of unit in terms of kg. of materials	= 30,000 kg.
Size of one unit	= 20 grams.
Total number of units p.m.	= 30,00 x 1000/20. = 15,00,000 units.

Assuming the unit to operate at 75% of installed capacity.

Therefore total number of units produced p.m. is
= 11,25,000

Cost of one unit = Rs. 6/- per unit.

Variable per unit = 16,95,975/11,25,000
= Rs. 1.51

Break even quantity $= \frac{7165000}{(6-1.51)}$
= 15,957,69 units.

Break even sales $= \frac{7165000}{(6-1.51)} \times 6$
= Rs. 95,74,614=00

Break Even Period = 8.511 months
= 260 days.

Therefore, from the break even analysis it has been decided that in order to produce 15,00,000 units of 20 gram packets of ready to eat extruded snacks of blended flour consisting of blend of Sattu and Kodo powder in the blend ratio of 40:60 with identified infrastructure the break even quantity is 15,957,69 units, the break even sales is Rs. 95,74,614=00 and break even period comes out to be 260 days.

References

Harper J.M. (1981).Extrusion of Foods, Boca Raton, FL, CRC Press, Inc.

How to cite this article:

Devendra Kumar, Shobha Rani and Varsha Kumari. 2018. Benefit-Cost Ratio for Production Process of Extruded Products Prepared From Different Blends of Sattu and Kodo. *Int.J.Curr.Microbiol.App.Sci.* 7(05): 3802-3806. doi: https://doi.org/10.20546/ijcmas.2018.705.442