



ISSN: 2456-2912

VET 2024; SP-9(1): 754-756

© 2024 VET

www.veterinarypaper.com

Received: 18-11-2023

Accepted: 26-12-2023

Neha Solunke

M.Sc. (Agri), Department of Animal Husbandry and Dairy Science, Vasantnao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

SG Narwade

Associate Professor, Department of Animal Husbandry and Dairy Science, Vasantnao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

GK Londhe

Head, Department of Animal Husbandry and Dairy Science, Vasantnao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Corresponding Author:

Neha Solunke

M.Sc. (Agri), Department of Animal Husbandry and Dairy Science, Vasantnao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India

Studies on physio-chemical properties of *kalakand* using jaggery powder

Neha Solunke, SG Narwade and GK Londhe

Abstract

The present investigation on “Studies on preparation of *kalakand* using jaggery as sweetening agent” was undertaken during 2021-2022 at the Department of Animal Husbandry and Dairy Science, College of Agriculture, Vasantnao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra.

Kalakand was prepared from buffalo milk (standardized with 6 per cent fat and 9 per cent SNF) and the different level of jaggery powder (5, 7, 9, 11part by vol. of milk). On the average jaggery powder *kalakand* of treatment T₁, T₂, T₃, T₄, and T₅ contained moisture 21.78, 22.71, 22.26, 21.71, and 21.39 per cent, fat 20.92, 19.92, 19.52, 19.14, and 18.70 per cent, protein 15.00, 14.28, 13.99, 13.71 and 13.39 per cent, ash 2.62, 2.59, 2.63, 2.68 and 2.72 per cent, total solid, 76.22, 77.29, 77.74, 78.17 and 78.61 per cent, carbohydrate 37.68, 40.50, 41.60, 42.76 and 43.80 per cent, respectively.

Keywords: *Kalakand*, Jaggery, powder

Introduction

Since it was created to be a complete diet for developing young animals, milk has earned the reputation of being nature's most complete food. It is also a food of exceptional interest. A well- balanced diet is necessary for optimal health and development. Milk and milk products provide the necessary nutrients for a balanced diet. It provides minerals that form bones, vitamins that promote health, and energy-boosting lactose and milk fat. It also provides proteins that help build muscle. Milk is a vital food for developing children, adolescents, adults, invalids, convalescents, and patients because of all these qualities. (De, 1982).

A byproduct of sugarcane, jaggery is abundant in vital minerals. (calcium: 40– 100 mg, magnesium: 70–90 mg, potassium: 1056 mg, phosphorus: 20–90 mg, sodium: 19–30 mg, iron: 10–13 mg, manganese: 0.2–0.5 mg, zinc: 0.2–0.4 mg, copper: 0.1–0.9 mg, and chloride: 5.3 mg per 100 g of jaggery), vitamins (vitamin A: 3.8 mg, vitamin B1: 0.01 mg, vitamin B2: 0.06 mg, vitamin B5: 0.01 mg, vitamin B6: 0.01 mg, vitamin C: 7.00 mg, vitamin D2: 6.50 mg, vitamin E: 111.30 mg, and vitamin PP: 7.00 mg), and protein: 280 mg per 100 g of jaggery, which can be widely distributed to reduce the issues of undernutrition and malnutrition (Pattnayak and Misra 2004).

Materials and Methods

The current research on the “Studies on preparation of *kalakand* using jaggery as a sweetening agent” was conducted at the Department of Animal Husbandry and Dairy science, College of Agriculture, Vasantnao Naik Marathwada Krishi Vidyapeeth, Parbhani. The materials and methods which was employed for carry out the research was as under.

Materials

Following materials and ingredients were used to meet the objectives of the present study.

Buffalo milk

Whole, fresh, clean buffalo milk was obtained from buffalo unit of Department of Animal Husbandry and Dairy Science, College of Agriculture, Parbhani.

Jaggery powder: Jaggery powder was procured from local market of Parbhani city.

Citric acid

Citric acid was used as coagulant for preparation of *Kalakand*.

Weighing balance

Weighing balance available in the PG laboratory was used for the weighing of ingredient used for the preparation of *kalakand*.

Chemicals and Glass wares

The glassware's required for conducting chemical analysis and preparation of product was utilized from the PG laboratory of Department of AHDS, College of Agriculture, Parbhani.

Khunti

For scraping and stirring milk solids, a long-handled, stainless steel khunti with a flattened end and a rather sharp edge was utilized.

Gas shegdi

The gas shegdi was available in the Department of Animal Husbandry and Dairy science was used for preparation of *kalakand*.

Karahi

The milk was desiccated using an iron karahi that could hold five liters of milk.

pH meter

A digital pH meter manufactured by Lab Techno, Mumbai (Maharashtra) was used to determination of pH.

Laminar air flow

An instrument manufactured by Kirloskar Electronic Ltd. (India) was used for microbiological work.

Autoclave

An instrument manufactured by M/S. Modern Industrial Corporation (MIC) Mumbai (India) was used for autoclaving purpose.

Colony counter

A colony counters with magnifying lens was used for counting the colonies formed by microorganisms.

B.O.D. incubator

B.O.D. incubator manufactured by Micro Scientific Works Pvt. Ltd. (MSW), Delhi available in the Department of Animal Husbandry and Dairy Science was used for incubation.

Muffle furnace

Muffle furnace was used for the determination of ash in the *kalakand* throughout the study period. Muffle furnace is manufactured by Micro Scientific 17 Works Pvt. Ltd. (MSW) Delhi.

Methods Treatment details

Preparation of *kalakand* with addition of jaggery powder following treatment combinations were taken for study:

T₁ = Control sample (*Kalakand* prepared from buffalo milk with addition of 6% sugar). T₂= 95 parts of buffalo milk + 5

parts of jaggery powder

T₃= 93 parts of buffalo milk + 7 parts of jaggery powder T₄=

91 parts of buffalo milk + 9 parts of jaggery powder T₅ = 89

parts of buffalo milk + 11 parts of jaggery powder

The experiment was conducted in five treatments with five replications.

Results and Discussions**Physico-chemical composition of jaggery powder *kalakand* Moisture content of *kalakand* using jaggery powder**

It was cleared from table 1 that the moisture content of *kalakand* was maximum for treatment T₁ and it decrease gradually to T₅. The moisture content for treatment T₁, T₂, T₃, T₄ and T₅ were 23.78, 22.71 22.26, 21.71 and 21.39 per cent respectively. The treatment T₃ recorded the moisture content 22.26 per cent. The moisture content of *kalakand* decreased in treatment T₃

(22.26 per cent) as compare to T₂ (22.71 per cent) and T₁ (23.78 per cent), whereas in treatment T₄ (21.71 per cent) and T₅ (21.39 per cent). As jaggery powder level increased, moisture content in *kalakand* decreased. It was seen from table 1 that the moisture content of *kalakand* is highest for treatment T₁ and it decreased gradually to T₅.

Table 1: Effect of various levels of jaggery powder on moisture content of *kalakand*

Treatments	Replications					Mean %
	R1	R2	R3	R4	R5	
T ₁	23.82	23.86	23.74	23.77	23.72	23.78a
T ₂	22.70	22.66	22.74	22.73	22.72	22.71b
T ₃	22.29	22.20	22.24	22.26	22.31	22.26c
T ₄	21.74	21.70	21.68	21.72	21.71	21.71d
T ₅	21.36	21.42	21.37	21.41	21.39	21.39e
SE ± 0.015						CD at 5% 0.054

(Note: The mean value with different superscripts within same column differed significantly ($p < 0.05$))

Fat content of *kalakand* using jaggery powder

Table 2: Effect of various levels of jaggery powder on fat content of *kalakand*

Treatments	Replication					Mean %
	R1	R2	R3	R4	R5	
T ₁	20.90	20.95	20.90	20.88	20.97	20.92a
T ₂	19.84	19.87	19.92	19.97	19.90	19.92b
T ₃	19.58	19.48	19.55	19.47	19.52	19.52c
T ₄	19.12	19.20	19.14	19.08	19.16	19.14d
T ₅	18.66	18.72	18.68	18.71	18.73	18.70e
SE ± 0.015						CD at 5% 0.056

(Note: The mean value with different superscripts within same column differed significantly ($p < 0.05$))

It was seen from table 2 that the fat content of *kalakand* was significantly affected due to addition of jaggery powder. The average fat content was significantly maximum for treatment T₁ (20.92) per cent and it decreased gradually to T₅ (18.70) per cent. The fat content for treatment T₁, T₂, T₃, T₄ and T₅ were 20.92, 19.92, 19.52, 19.14 and 18.70 per cent respectively. The treatment T₃ recorded the fat content 19.52 per cent. The fat content of *kalakand* decreased in treatment T₃ (19.52 per cent) as compare to T₂ (19.92 per cent) and T₁ (20.92 per cent).

Protein content of kalakand using jaggery powder

Table 3: Effect of various levels of jaggery powder on protein content of kalakand

Treatments	Replications					Mean %
	R1	R2	R3	R4	R5	
T ₁	15.00	14.92	15.10	14.92	15.06	15.00a
T ₂	14.23	14.28	14.34	14.24	14.31	14.28b
T ₃	13.95	13.98	14.06	14.00	13.96	13.99c
T ₄	13.70	13.76	13.72	13.66	13.71	13.71d
T ₅	13.36	13.41	13.40	13.36	13.42	13.39e
SE ± 0.019						CD at 5% 0.066

(Note: The mean value with different superscripts within same column differed significantly ($p < 0.05$))

It was cleared from table 3 that the protein content of kalakand was significantly affected due to addition of jaggery powder. The average protein content was significantly maximum for treatment T₅ (13.39 per cent). The protein content for treatment T₁, T₂, T₃, T₄ and T₅ were 15.00, 14.28, 13.99, 13.71, 13.39 and per cent respectively. The treatment T₃ had the protein content 13.99 per cent. As jaggery powder level was increased, protein content in kalakand was also decreased.

Ash content of kalakand using jaggery powder

Table 4: Effect of various levels of jaggery powder on ash content of kalakand

Treatments	Replications					Mean %
	R1	R2	R3	R4	R5	
T ₁	2.64	2.60	2.66	2.58	2.62	2.62c
T ₂	2.54	2.60	2.62	2.58	2.61	2.59c
T ₃	2.61	2.60	2.68	2.62	2.64	2.63bc
T ₄	2.74	2.64	2.70	2.72	2.60	2.68ab
T ₅	2.78	2.68	2.72	2.74	2.68	2.72a
SE ± 0.015						CD at 5% 0.054

(Note: The mean value with different superscripts within same column differed significantly ($p < 0.05$))

From table 4 it was cleared that the ash content of kalakand was significantly affected due to addition of jaggery powder. The maximum ash content in treatment T₅ (2.72 per cent), whereas minimum in treatment T₁ (2.62 per cent). The ash content for treatment T₁, T₂, T₃, T₄ and T₅ were 2.62, 2.59, 2.63, 2.68, and 2.72 per cent respectively. The treatment T₃ recorded the ash content 2.63 per cent. The ash content of kalakand increased in T₃ (2.63 per cent) as compare to T₂ (2.59 per cent) and T₁ (2.62 per cent) whereas, increase in treatment T₄ (2.68 per cent) and T₅ (2.72 per cent). It was observed that as the jaggery powder level increased, ash content in kalakand also increased. Total solid content of kalakand using jaggery powder

Table 5: Effect of various levels of jaggery powder on total solid content of kalakand

Treatments	Replications					Mean %
	R1	R2	R3	R4	R5	
T ₁	76.18	76.26	76.22	76.20	76.24	76.22e
T ₂	77.25	77.30	77.28	77.32	77.30	77.29d
T ₃	77.70	77.76	77.78	77.74	77.72	77.74c
T ₄	78.10	78.18	78.22	78.20	78.15	78.17b
T ₅	78.57	78.62	78.60	78.64	78.62	78.61a
SE ± 0.011						CD at 5 % 0.041

(Note: The mean value with different superscripts within same column differed significantly ($p < 0.05$))

It was seen from table 5 that the total solid content of kalakand was significantly affected due to addition of jaggery. The total solid content for treatment T₁, T₂, T₃, T₄ and T₅ were 76.22, 77.29, 77.74 and 78.61 per cent respectively.

Total Carbohydrate content of kalakand using jaggery powder

Table 6: Effect of various levels of jaggery powder on total carbohydrate content of kalakand

Treatments	R1	R2	Replications	R4	R5	Mean %
			R3			
T ₁	37.64	37.70	37.68	37.66	37.72	37.68e
T ₂	40.46	40.52	40.54	40.50	40.48	40.50d
T ₃	41.56	41.61	41.60	41.62	41.61	41.60c
T ₄	42.79	42.75	42.80	42.74	42.72	42.76b
T ₅	43.81	43.76	43.81	43.80	43.82	43.80a
SE ± 0.009						CD at 5 % 0.034

(Note: The mean value with different superscripts within same column differed significantly ($p < 0.05$))

It was cleared from table 6 that the total carbohydrate content of kalakand was significantly affected due to addition of jaggery. The maximum carbohydrate content in treatment T₅ (43.80 per cent), whereas minimum in treatment T₁ (37.68 per cent). The carbohydrate content for treatment T₁, T₂, T₃, T₄ and T₅ were 37.68, 40.50, 41.60, 42.76, 43.80. per cent respectively.

Conclusion

While in chemical composition scores, control (T₁) was acceptable and liked very much but as compared to other treatment levels, T₃ with 7 per cent of jaggery powder gained acceptable score with like very much score. Hence, it is concluded that treatment T₃ is more nutritious and cheaper for consumers. The chemical composition of T₃ contain moisture 22.26 per cent, fat 19.52 per cent, proteins 13.99 per cent, ash 2.63 per cent, titratable acidity 0.029 per cent, total carbohydrate 43.31 per cent, total solids 77.74 per cent and pH 6.38.

References

- Jadhav JV. Studies on preparation of almond katli using jaggery as sweetening agent [M.Sc. (Agri.) Thesis]. Parbhani: Vasantrao Naik Marathwada Krishi Vidyapith; c2021.
- Sawant VY, Thombre BM, Chauhan DS, Padghan PV. Preparation of kalakand with sapota fruit. Journal of Dairying, Foods & Home Sciences. 2006;25(3/4):186-189.
- Sonwane RS, Sonkamble SB. Effect of replacement of sugar with jaggery powder on sensory and nutritional quality of Shrikhand. Asian Journal of Dairy and Food Research. 2020;39(4):296-299.
- Bhagyashri T, Desale RJ, Ashwini M. Studies on Physico Chemical Properties of Custard Apple kalakand. Trends in Biosciences. 2017;10(3):1074-1075.
- Ubale PJ, Hembade AS, Choudhari DM. To study the effect of level of jaggery and sapota pulp on chemical quality of kulfi. Research Journal of Animal Husbandry and Dairy Science. 2014;5(2):62-67.
- Verma G, Singh SS, Singh R, Singh A. Development and quality assessment of kalakand prepared by using buffalo

milk blended with coconut milk and sapota. The Pharma
Innovation Journal. 2018;7(8):52-56.