



## **COST ANALYSIS OF HERBAL GHEE PREPARED WITH DRUM STICK (*Moringa Oleifera*) DRY LEAVES AND ARJUNA (*Terminalia Arjuna*) BARK**

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### **Abstract:**

*Herbal ghee is prepared by incorporating medicinal herbs showed average experimental cost. Arjuna and Moringa are popular medicinal plant and containing antimicrobial and nutritional values. Arjuna is effective for a variety of heart related conditions like high blood pressure, heart palpitations, rapid heartbeat and high cholesterol. M. oleifera leaves are highly nutritious. These reports are very encouraging and indicate that this should be studied more extensively for its therapeutic benefits. The present study is carried out to find the cost of herbal powder inclusion in the ghee. The result shows that 0.5% level of Arjuna and 1% level of Moringa were best and highest in sensory evaluation and cost analysis.*

**Keywords-** Sensory Evaluation, Drum Stick, Arjuna & Herbal Ghee

### **Introduction:**

According to the definition of USDA (2011), water buffalo milk is the normal lacteal secretion practically free of colostrum, obtained by the complete milking of one or more healthy water buffalo. Buffalo milk is a totally natural product that can be consumed like any other milk. Buffalo milk is nearly twice as rich in fat as compared to cow milk and the most important fraction responsible for its high energetic and nutritive value. Verrocchio *et al.* (2007) reported the fact that the fat content has an average value of 8.3% but can also reach up to 15% under normal conditions. Tonhati *et al.*, (2011) found the fat yield means  $90.1 \pm 24.6$  g.kg<sup>-1</sup>. Medhammar *et al.* (2011) also found the interbreed differences of in total fat in buffalo, yak, mare and dromedary camel milks and as well in the mineral contents. Ghee is considered to be the healthiest source of edible fat, with many beneficial properties. Ghee promotes longevity and protects the body from various diseases. Ghee is a fat-rich dairy product, widely used in India from ancient time. It has been an integral part of our culture. It is mainly used as food and flavouring ingredient. But ghee contains cholesterol, which is one of the suspected culprits of heart disease and diabetes. Hence, health-conscious people are scared of taking ghee. To alleviate this fear, the present study was undertaken to develop a process for herbal ghee, i.e. Arjuna and Moringa ghee, with functionalities like resistance to heart diseases, property to regulate blood pressure, increase immunity of human health. Parmar *et al.* (2013) reported that ethanolic extract of *Arjuna* bark increased the shelf life of ghee as compare to control sample during storage at 80°C. Their findings also suggested that freshly prepared ghee from cow milk added with

Arjuna bark had good potentiality to act as free radical scavenger. Jennifer *et al.* (2014) reported that *Moringa oleifera* is commonly known as "Drumstick". It is the most popular tropical crop. All its parts were used especially for their pharmacological, nutritional and water purification properties. Different parts of this plant contain a sketch of important minerals, and are a good source of protein, various phenolics, vitamins,  $\beta$  - carotene and amino acids. The Moringa plant offers a rich and exceptional combination of zeatin, kaempferom, quercetin and many other phytochemicals. It is very significant for its medicinal value. Numerous parts of the plant such as the roots, seed, bark, leaves, fruit, and immature pods, flowers act as cardiac and circulatory drugs, antipyretic, anti-ulcer, anti-inflammatory, antiepileptic. Other chief medicinal properties of the plant include antispasmodic, diuretic, antihypertensive, cholesterol lowering, hepato protective, antioxidant, antidiuretic, antibacterial and antifungal activities. Moringa tree is cultivated for foods and medicinal purposes (Olson, 2002). Moringa leaf is a natural anthelmintic, antibiotic, detoxifier, outstanding immune builder used in some countries for the treatment of malnutrition and malaria (Thilza *et al.*, 2010) Moringa leaves are known to have a high content of protein, minerals and vitamin, hence an ideal nutritional supplement, (Bajpai *et al.*, 2005; Sreelatha and Padma, 2009; Sultana *et al.*, 2009; Singh *et al.*, 2009). However, much has not been reported on the antibacterial healing property of *M. oleifera* leaf. The present study therefore reported the antimicrobial activity of *M. oleifera* leaf on some enters pathogens and orthopaedics' wounds bacterial and fungal organisms as well as its nutritional potentials. Mehta (2006) reported that addition of methanol pre-extract of de-husked ragi powder (DRP) at the rate of 0.1%, 0.25% and 0.5% resulted in a corresponding increase (over control) in phospholipids content and water extractable phenolic content of ghee. The anti-oxygenic indices calculated from the induction periods of ghee samples stored at  $80 \pm 20^\circ\text{C}$  in comparison with sample of ghee added DRP gave better result than control sample in order to prevent oxidative rancidity. Gandhi *et al.* (2013) evaluated antioxidative properties of Viadarikand ethanolic extract in ghee and reported that ethanolic extract of the vidarikand was more effective for preventing the development of the peroxide value and conjugated diene value in ghee during storage. Vidarikand ethanolic extract showed the higher induction period as compare to control ghee sample. Betel and curry leaves when added at 1.0 per cent level to ghee showed higher resistance to oxidative deterioration than BHA and BHT mixture. These leaves also contained some ascorbic acid which might work as synergist (Sethi and Aggarwal, 1956). When betel, curry and drumstick leaves were added at 1.0 and 3.0 per cent levels to ghee, which was subsequently stored for 12 m at ambient temperature, only curry leaves could protect ghee from hydrolytic rancidity and none could prevent oxidative deterioration (Thakar *et al.*, 1984). According to above studies herbal ghee was prepared. . The experiment aimed of experimental cost of herbal ghee, incorporated with of *Moringa oleifera* dry leaves and *Arjuna* bark.

#### **Material and Methods:**

Manufacture of *Arjuna* and *Moringa* herbal ghee, first *Arjuna* bark was sorted, cleaned and dried at  $60^\circ\text{C}$  in hot air oven for 2 hours and then made into small bits in mortar and pestle and then powdered using a grinder and Moringa leaf clean and dry in shade then grind the leaves in fine particle. The buffalo cream obtained from the student training Dairy of SHIATS, Allahabad was standardized to 60 % fat.

The standardized cream was then pasteurized at  $80^\circ\text{C}$  for 2 min then cooled to  $32^\circ\text{C}$  and then *Arjuna* bark and *Moringa* leaves powder was added to the cream and keep overnight. Clarification of ghee was done by boiling the above mixture on gas stove

till complete evaporation of moisture. The clarification temperature was maintained between 110 and 120°C. The ghee was filtered first using muslin cloth and then allowed to settle for 30 min at 75-80°C and then filtration of fine particles was done using cotton filter pad. Filtered ghee was allowed to cool naturally to 25°C for crystallization for better body and texture. Herbal ghee prepared in deferent treatments is from buffalo milk cream (60% fat) and herbs used in deferent level respectively. Treatments of herbal ghee are: control treatment (T<sub>0</sub>) plain ghee and T<sub>1</sub> to T<sub>16</sub> are experimental treatments with deferent level of herbs. Cost formulation of herbal ghee calculated on the basis of ingredients market rate.

Ghee samples were determined by the method described in Indian standard (IS: 3508-1966) All testing is done lab manual -1 manual of methods of analysis of foods milk and milk products food safety and standards authority of India Ministry of health and family welfare government of India New Delhi (2015).

**Table 1. Quantity of Ingredients Used in the Preparation of Herbal Ghee (1 Kg)**

Treatment	Weight (Gm.) of Ingredients Use in Ghee						Total Weight (Gm.)
	Cream 60% Fat (Gm.)	Herbs					
		Herbs In (Gm.)	Arjuna		Moringa		
			%	Gram	%	Gram	
T <sub>0</sub>	1661.13	0.00	0 %	0	0 %	0	1000
T <sub>1</sub>	1666.67	16.84	0.5%	8.418	0.5%	8.418	1000
T <sub>2</sub>	1666.67	25.38	0.5%	8.460	1%	16.92	1000
T <sub>3</sub>	1665.24	34.33	0.5%	8.584	1.5%	25.75	1000
T <sub>4</sub>	1666.67	42.74	0.5%	8.547	2%	34.19	1000
T <sub>5</sub>	1665.26	25.36	1%	16.91	0.5%	8.45	1000
T <sub>6</sub>	1666.67	34.01	1%	17.01	1%	17.01	1000
T <sub>7</sub>	1666.67	42.74	1%	17.01	1.5%	25.73	1000
T <sub>8</sub>	1665.24	51.50	1%	17.16	2%	34.34	1000
T <sub>9</sub>	1661.02	33.90	1.5%	25.42	0.5%	8.47	1000
T <sub>10</sub>	1656.75	42.48	1.5%	25.47	1%	17.01	1000
T <sub>11</sub>	1666.67	51.55	1.5%	25.77	1.5%	25.77	1000
T <sub>12</sub>	1665.23	60.40	1.5%	25.88	2%	34.52	1000
T <sub>13</sub>	1665.24	42.70	2%	34.16	0.5%	8.54	1000
T <sub>14</sub>	1665.24	51.50	2%	34.34	1%	17.16	1000

T <sub>15</sub>	1666.67	60.45	2%	34.52	1.5%	25.93	1000
T <sub>16</sub>	1665.22	69.38	2%	34.69	2%	34.69	1000

**Results and Discussion:**

**Cost of Materials Used In Herbal Ghee**

Before launching a newly developed product in the market, assessment of its techno-economic feasibility is a prerequisite. After the development of necessary technology for the manufacture of herbal ghee it is logical to assess its cost of production. However, in view of the limited scope of present investigation only the cost of ingredients is being estimated.

**Table 2: Cost (Rs. /Kg) Of Materials Used In the Preparation of Herbal Ghee**

Treatment	Cost Of Ingredients Use In Ghee Rate/Kg (Rs)			Cost / Kg (Rs)
	Cream	Arjuna	Moringa	
		190	80	50
T <sub>0</sub>	315.61	0	0	315.61
T <sub>1</sub>	316.67	0.59	0.42	317.68
T <sub>2</sub>	316.67	0.59	0.85	318.10
T <sub>3</sub>	316.39	0.60	1.29	318.28
T <sub>4</sub>	316.67	0.60	1.71	318.97
T <sub>5</sub>	316.40	1.18	0.42	318.01
T <sub>6</sub>	316.67	1.19	0.85	318.71
T <sub>7</sub>	316.67	1.19	1.29	319.14
T <sub>8</sub>	316.39	1.20	1.72	319.31
T <sub>9</sub>	315.59	1.7794	0.4235	317.80
T <sub>10</sub>	314.78	1.7829	0.8505	317.42
T <sub>11</sub>	316.67	1.80	1.29	319.76
T <sub>12</sub>	316.39	1.8116	1.726	319.93
T <sub>13</sub>	316.40	2.39	0.43	319.21
T <sub>14</sub>	316.39	2.4038	0.858	319.66
T <sub>15</sub>	316.67	2.4164	1.2965	320.38
T <sub>16</sub>	316.39	2.43	1.73	320.56

**Note:** -Processing cost @10% of total Cost.

The above table shows that the average cost of 1 kg of sample of herbal ghee prepared from Moringa and Arjuna herbs in T<sub>16</sub>(320.56), T<sub>15</sub>(320.38), T<sub>12</sub>(319.93), T<sub>11</sub>(319.76), T<sub>14</sub>(319.66), T<sub>8</sub>(319.31), T<sub>13</sub>(319.21), T<sub>7</sub> (319.14), T<sub>4</sub>(318.97), T<sub>6</sub> (318.71), T<sub>3</sub>(318.28), T<sub>2</sub>(318.1), T<sub>5</sub> (318.01), T<sub>9</sub> (317.8), T<sub>1</sub> (317.68), T<sub>10</sub> (317.42) and T<sub>0</sub> (315.61).

#### **Conclusion:**

Ghee has been considered immensely superior to other fats mainly because of the presence of characteristic short chain fatty acids, carrier of four fatsoluble vitamins viz., A, D, E, K and essential fatty acids such as linoleic acid and arachidonic acid. It is therapeutic value and antioxidant content multiplied with addition of herbs i.e. Drum stick leaves, Arjuna bark and could be used as medicated ghee for marketing.

#### **References:**

1. Bajpai, M., Pande, A., Tewari, S. K. and Prakash, D. (2005). Phenolic contents and antioxidant activity of some food and medicinal plants. *International Journal of Food Science and Nutrition* 56(4): 287- 291.
2. Food Safety and Standards Authority of India: Manual of Methods of Analysis of foods milk and milk products, Ministry of Health and Family Welfare, Government of India, 2015.
3. Gandhi K, Arora S, Nilkanth P and Kumar A (2013). Effect of Vidarikand (extracts) on oxidative stability of ghee: A comparative study. *Research and Reviews: Journal of Dairy Science and Technology*, 2: 1.
4. IS:3508 (1966). Indian Standards, Methods for Sampling and Test for Ghee (Butterfat). New Delhi: Bureau of Indian Standards.
5. Jennifer A., Anchana D. (2014). a study on phytochemical screening and antibacterial activity of *Moringa oleifera*.: *International Journal of Research in Applied, Natural and Social Sciences*. Vol. 2, Issue 5, May, 169-176
6. Medhammar, E., R. Wijesinha-Bettoni, B. Stadlmayr, E. Nilsson, U. R. Charrondiere, and B. Burlingame (2011). Composition of milk from minor dairy animals and buffalo breeds: a biodiversity perspective. *J. Sci. Food Agric.*92(3):445-474.
7. Mehta BM (2006). Ragi (*Eleusinecoracana L*) -a natural antioxidant for ghee (butter oil). *International Journal of Food Science and Technology*, 41: 86.
8. Olson, M. E. (2002). Amplified fragment length polymorphism (AFLP) analysis of genetic variation in *Moringa oleifera* Lam. *Molecular Ecology* 8(3): 463- 470
9. Parmar P, Kaushik K, Devaraja HC and Singh RRB (2013). The effects of alcoholic extract of Arjuna (*Terminaliaarjuna.*) bark on stability of clarified butterfat. *Journal of Medicinal Plants Research*, 7(35): 2245.
10. Patel RS and Rajorhia GS (1979). Antioxidative role of curry (*Murryakoenigi*) and betel (*Piper betel*) leaves in ghee. *Journal of Food Science and Technology*, 16: 158.
11. Sethi SC and Aggarwal JS (1956). Stabilization of fats by spices: Part II. A new antioxidant from betel leaf. *Journal of Science and Industrial Research*, 15B: 34.
12. Thakar PN, Prajapati PS, Pandya AJ, Upadhyay KG and Vyas SH (1984). Effect of some natural antioxidant on free fatty acid and peroxide value of ghee during storage. *Gujarat Agriculture University Research Journal*, 9: 40.
13. Tonhati, H, A. L. Lima, D. P. Lanna, G. M. de Camargo, F. Baldi, L. G. de Albuquerque and J. M. Montrezor (2011). Milk fatty acid characterization and genetic parameter estimates for milk conjugated linoleic acid in buffaloes. *J. Dairy Res.* 4:1-6

14. USDA (United States Department of Agriculture). (2011). Milk for manufacturing purposes and its production and processing: recommended requirements. <http://www.ams.usda.gov/AMSV1.0/getfile?dDocName=STELDEV3004791>
15. Varrichio, M. L., A. Di Francia, F. Masucci, R. Romano and V. Proto (2007). Fatty acid composition of Mediterranean buffalo milk fat. *Italian J. Animal Sci.* 6:509-511