

## Review

# GHEE

(Granulated Ghee is made from cow milk and has Vitamin A, D, E, and Beta Carotene which helps increase immunity)

## Introduction and health benefits of Vitamin A, D, E, and Beta Carotene in Ghee

### **Introduction**

Milk as well as ghee from a cow is known for its plenty of beta-carotene (Ullah et al., 2016; Gallier et al., 2011, Ahmad and Saleem., 2019). Cattle raising and dairy business have traditionally been rooted in India's rural economy moreover, India is the leading producer and consumer of dairy products. As per the report of Indian Dairy Products Market Forecast & Opportunities, 2017, the market for dairy products has opened a wide window in the food processing sector, simultaneously if provided with proper stable and sanitized conditions to achieve the international standards. The market in our country has grown rapidly over the last few decades and is predicted to be growing at a faster rate as compared to the global dairy market. Among all dairy products, ghee is the most valuable item as per its cost, nutrition, and flavor attribute (Kumar et al., 2018).

According to the **Prevention of Food adulteration act**, (effective from 1.10.2004), ghee is a pure clarified fat derived from milk after processing. . Ghee is an anhydrous butter containing various fatty acids. The nutritive status of ghee mainly depends on the milk sources i. e. cow, buffalo, sheep, etc as well as physical parameters applied during the manufacturing processes. The intake of ghee in diet differs in the state, community, and region (Simopoulos et al., 1999). India is the world's largest producer and the largest consumer of ghee. In 2018, combined butter and ghee production is estimated at 5.6 MMT, increased by 3.7 percent from the previous year on rising domestic demand due to population growth and demographic shifts (GAIN report, 2018).

According to the consumer voice report, January 2020 (Accessed 26.04.2021), (<https://consumeraffairs.nic.in/sites/default/files/file-uploads/ctocpas/COW%20GHEE.pdf>), the concentration of beta carotene was highest in **Ananda** and **Amul** than other brands summarized in the following table:

### Comparative Testing of Cow Ghee

Brand/Parameters	% weightage	Ananda	Amul	Milkfood	Patanjali	Mother Dairy	Verka	Anik	Fresh & Pure	Britannia	Baidyanath	Gowardhan
Physico-chemical Tests												
Description	2	2	2	2	2	2	2	2	2	2	2	2
Flavour & Taste	6	6	6	6	6	6	6	6	6	6	6	6
Presence of animal fat (other than milk fats)	4	4	4	4	4	4	4	4	4	4	4	4
Moisture	4	4.00	3.52	3.76	3.60	3.40	3.76	3.64	3.76	3.76	2.20	3.52
Free Fatty Acids	5	4.40	5.00	4.85	4.55	4.93	4.55	3.95	4.03	3.73	2.00	4.10
Reichert-Meissl Value	3	3	3	3	3	3	3	3	3	3	3	3
Saturated fat	5	3.28	3.92	2.80	3.06	4.74	3.39	2.61	3.35	2.58	4.00	3.32
Mono unsaturated fatty acid	5	4.07	3.92	3.25	3.69	3.90	3.85	3.41	4.12	3.23	4.46	3.65
Poly unsaturated fatty acid	5	3.51	3.80	4.40	3.99	2.95	3.57	3.36	3.55	3.96	5.00	3.34
Trans fatty acid (Trans Fat)	5	3.69	3.04	3.55	3.43	3.16	3.70	3.64	3.17	3.80	4.23	3.05
Cholesterol	4	2.73	3.60	4.00	3.08	3.51	2.83	3.08	2.08	2.33	2.78	2.58
Butyro-Refractometer Reading	4	3.80	3.80	3.60	3.60	3.40	3.60	3.40	3.60	3.60	3.80	3.80
Peroxide Value	4	4	4	4	4	4	4	4	4	4	4	4
Milk Fat	14	14.00	13.44	13.72	13.58	13.30	13.72	13.58	13.72	13.72	12.04	13.44
Vitamin A	7	6.23	5.47	5.26	6.10	5.24	5.35	5.59	5.91	5.66	6.88	4.97
Beta carotene	8	8.00	7.60	6.41	6.53	6.46	5.50	7.05	5.92	5.98	3.48	4.94
Baudouin test	5	5	5	5	5	5	5	5	5	5	5	5
Coliform count cfu/gm	3	3	3	3	3	3	3	3	3	3	3	3

The Lab reports from **NABL and TUV** of our proposed **GOOD MORNING'S GRYANULAA Cow ghee** product (with the reference number - **ULR-TC 546021000018494P, Test Report no. BLR/F(C/M)/21/017065, dated 06/05.2021**) confirmed that our proposed product has sufficient levels of **Vitamin A, D, E, and Beta carotene**.

### *Health benefits of Vitamin A, D, E, and Beta carotene (Increases Immunity)*

- **WHO and FAO**, (2006) jointly published a report (Edited by Lindsay et al., 2006). According to that report, a high dose of **vitamin A** supplementation can reduce mortality from measles by as much as 50%. Another analysis found that

improvement of vitamin A status, whether by supplementation or fortification, decreased all-cause mortality in children aged between 6 months and 5 years by 23% (Codex general guidelines, 1991). In addition to causing night blindness, vitamin A deficiency is probably an important contributor to maternal mortality and other poor outcomes in pregnancy and lactation. According to the results of (West et al., 1999), regarding the case study of vitamin A-deficient pregnant women who **received vitamin A or  $\beta$ -carotene** supplements at doses equivalent to their weekly requirement for the vitamin, maternal mortality was reduced by 40%, and 49%, respectively, relative to a control group.

- **USDA's National Agriculture Library** published a report on vitamin A that concluded that **Vitamin A** is involved in regulating the growth and specialization of virtually all cells in the human body. **Vitamin A** has important roles in embryonic development, organ formation during fetal development, **normal immune functions**, and eye development and vision. (<https://lpi.oregonstate.edu/mic/vitamins/vitamin-A>)
- **National Institute of Health (USDA-NIH)** in their official newsletter "MedlinePlus" reported, **Beta-carotene** having an antioxidant property that protects cells from damage caused by substances called free radicals. (<https://medlineplus.gov/ency/article/002400.htm>)
- **National Institute of Health (US Department of Health and Human services-NIH)** in their dietary supplements fact sheets reported some effects of beta carotene on the health that are,
  - i) People who eat a lot of *foods* containing **beta-carotene** might have a lower risk of certain kinds of cancer, such as lung cancer, But studies to date have not shown that **vitamin A or beta-carotene supplements** can help prevent or lower the chances of dying from this disease.
  - ii) Age-related muscular degeneration (AMD), or the loss of central vision as people age, is one of the most common causes of vision loss in older people. Among people with AMD who are at high risk of developing advanced AMD, a supplement containing antioxidants, zinc, and copper with or without **beta-carotene** has shown promise for slowing down the rate of vision loss.

iii) When children with **vitamin A** deficiency (which is rare in North America) get measles, the disease tends to be more severe. In these children, taking supplements with high doses of **vitamin A** can shorten the fever and diarrhea caused by measles. These supplements can also lower the risk of death in children with measles who live in developing countries where **vitamin A** deficiency is common.

- **In 2017, Ramchandra** reported, Vitamins **A and E** are anti-oxidant and are useful in preventing oxidative damage to the body & brain. He concluded that most of the components have anticonvulsant activity through one or another mechanism.
- **In 2014, Mahakalkar** and his research team reported several health benefits of **vitamins** present in ghee and their applications such as slows the aging process, enhances the body immune system, facilitates bowel movement, improve the health of the teeth & gums, prevent chronic cough issues and also disorders of eyes.
- **Kume and Toharmat in 2001** stated that **Vitamin A and  $\beta$ -carotene** have many diverse functions such as reproduction, **immune functions**, and health.
- **Chew Boon in 1992, reported, beta carotene** and other carotenoids modulate the **immune system**.
- **Tome et al., 2009** as well as **Rodriguez et al., 2014** reported that **Vitamin-A** is an essential element involved in critical biological processes such as cell growth and development, reproduction, vision, and **immune system functions**.
- **Bischoff-Ferrari in 2010**, in his report, suggested the benefits of **vitamin D** on cardiovascular mortality, hypertension, colorectal cancer, multiple sclerosis, type 1 diabetes, **immune function**, and inflammation.
- **Ga Lee and Han Sung in 2018**, reviewed immunological changes **with vitamin E** intervention in human beings as well as animals, and then they reported the cell-specific effects of **vitamin E** to understand the mechanisms of **immunomodulation** and implications of **vitamin E for immunological diseases**.

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The above information reviewed by,



Mr.Sandip K. Wagh,

(DST INSPIRE research Fellow)

(Newton Bhabha PhD placement Fellow, DST and British council)

Cell: 9325313681; 9404063718.

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