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### **A1 Versus A2 Milk: Go Vocal For Local**

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As an essential ingredient for cup of tea in the morning or as a healthy food for the kids and the elderly alike, milk is often present in every Indian household. Milk, the secretion of the mammary gland of mammals is considered a mixture of all essential nutrients necessary for human consumption. To meet this huge supply-demand gap, Operation Flood was launched back then in 1970, a landmark initiative of the National Dairy Development Board (NDDB) under the leadership of Dr. Verghese Kurien (Father of the White Revolution in India) which transformed India from a milk deficient nation to the largest milk producer globally (239.30 million tons during 2023-24 approximately). Among Cow, Buffalo, Sheep, Goat, and Camel, Cow is the major producer of milk (85% of world total annual milk supply). The majority of Cow's milk is water (87.2%) and the rest 12.8% is composed of lactose (4.7%), protein (3.4%), fat (3.5%), minerals, and other minor constituents like immunoglobulins, hormones, vitamins, enzymes, etc. [3].

#### **A1 Vs A2 Milk:**

The protein fraction of cow's milk is divided into whey and casein protein. Casein protein consists of 36% Alpha, 27% Beta and 9% kappa Casein. Among the three variants of casein, beta-casein is mainly responsible for genetic variation in cow's milk. Beta-casein consists of 12 genetic variants, *i.e.*, A1, A2, A3, B, C, D, E, F, H1, H2, I and G [1]. Among these variants, 'A1' and 'A2' are the mostly prevalent. Scientists have found that beta-casein has 209 amino acids, and due to point mutation at the 67th position, A1 and A2 variants of cow's milk differ. The A1

variant has histidine (a type of amino acid) at the 67th position and the A2 variant has proline (a type of amino acid) at this position [1].

### **Impact on Health: A1 & A2 Cow's Milk:**

During digestion of the A1 variant of beta-casein in human, a peptide Beta-casomorphin -7 (BCM-7) is released which is known to have opioid properties, whereas due to the presence of proline amino acid in the A2 milk, digestive enzymes cannot break the A2 variant. It is found that beta-casomorphin- 7 (BCM-7) oxidizes low dietary lipoprotein which may lead to the formation of artery plagues [2]. Researchers have also linked the association of A1 beta-casein milk with diabetes mellitus [4], lactose intolerance, autism, schizophrenia, and sudden infant death syndrome (SIDS) [2]. However, there exists a difference in opinions among researchers and scientists regarding consumption of A1 and A2 milk - whether A1 is good or A2 is good for human health.

### **How to identify A1 & A2 Milk:**

Several studies carried out by the National Bureau of Animal Genetic and Resources (NBAGR), Karnal, Haryana revealed that the desi breeds of cattle of Indian origin (particularly Sahiwal, Red Sindhi, Tharparkar, Gir, and Rathi) and buffaloes have 100% frequency of A2 allele which produces A2 Milk and the remaining desi breeds of cattle of Indian origin have 94% frequency of A2 allele [3].

Recently, the Food Safety and Standards Authority of India (FSSAI) has also permitted the sale of milk and milk products in A1 and A2 categories, which allows consumers to choose on their own.

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