

A LESSON FROM DCD ADULTERATED POWDERED MILK - WHAT WE OUGHT TO DO TOMORROW?

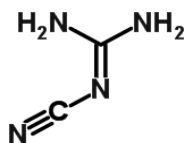
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The issue of presence of Dicyandiamide (DCD) in imported powdered milk in Sri Lanka yet remains obscure in the minds of general public. News published in the media with different angles about this subject has led to the inconclusive understanding of the presence of DCD in imported milk.

What is DCD?

DCD is a simple synthetic chemical compound consisted of elements of carbon, nitrogen and hydrogen.



Chemical structure of Dicyandiamide (DCD)

DCD is a precursor of melamine (this is the chemical found in powdered milk a few years back which caused a tragic situation in China), and its uses are diverse. The crux of DCD related to this discussion is its use in pastures of countries having a giant dairy industry (for instance New Zealand), where thousands of cattles (specially cows) are fed. The basis of such use is to manage possible environmental pollution risk of cattle farming. In addition to that, the structure of the DCD exhibits its potential to be used as a nitrogen fertilizer which is an essential element in pasture (plant) growth.

Formation of Pollutants

Cattles grazing on such pastures/meadows excrete urine in large volumes. The inherent odour of urine is basically due to ammonia emits as a gas. The nitrogen in ammonia can combine with oxygen in soil, producing different oxidized chemical compounds. The process is facilitated by soil microorganisms. Nitrate, a known major nutrient is one of such oxidation products. Nitrate is infinitely soluble in water, and hence it is mobilized completely with water (aqueous phase). Thus, wastewater rich in inorganic nutrients such as nitrate is cumbersome to treat. A convenient and practical method of treatment of nitrate rich waters is not well established yet.

Transformation of cattle's urine into nitrate and subsequent leaching into surface and ground water sources has posed a severe pollution risk in these countries. Other major oxidized products are gaseous compounds, namely nitric oxide and nitrous oxide. Nitrate is a direct culprit of water pollution when in excess. The latter two gases are atmospheric pollutants.

Role of DCD

Excess nitrate in drinking water may cause disastrous repercussion on health. Therefore, the World Health Organization (WHO) has stipulated a maximum tolerance value of 50 mg per liter (ppm) for drinking purposes. DCD acts in pastures to manage the transformation ammonia in cattle urine into above mentioned pollutants. Therefore, the probability of entering DCD into cattle as a result of pasture application is apparent. It will undergo various enzymatic pathways to metabolize and could excrete via feces (cow dung) and urine. Any residues of such a substance can enter into other organs of cattle and very firstly in cow milk. Therefore undoubtedly it will be expressed in powdered milk.

Nevertheless, it is questionable whether such trace levels of DCD gets into cow milk via food chain, is high enough to be detected even with a sophisticated instrument. Consequently, if DCD is found in a reasonable level, it is highly likely that there may be other sources for DCD to be present in powdered milk. So in this context, intentional addition of DCD into powdered milk to increase the

protein content could be postulated. Amino acids are the basic units of protein. Presence of one unit of nitrogen is a common feature in any amino acid. Consequently, amount of total nitrogen in milk, coming from different amino acids in protein is a measure of its total protein content. Unfortunately, the common method used to ascertain nitrogen content in milk cannot distinguish the protein based nitrogen and the other non-protein nitrogen. As a result, presence of non-protein nitrogenous substances that can practically be miscible with milk may result in false positive protein content.

The structure of DCD (see the figure) demonstrates that one unit consists of four units of nitrogen. Thus, a unit of DCD can donate four units of nitrogen demonstrating that it is a good source of nitrogen. Consequently, one DCD unit can act as four units of amino acids, thereby, demonstrating the easy ability to be used to enhance the pseudo protein content in milk. The truth behind the adulteration of powdered milk with Melamine that caused irreparable damage to humans and animals especially in China a few years back is a similar scenario. Even though quantitative determination of DCD used in pastures is a questionable matter, if powdered milk is adulterated with DCD to enhance protein content, the levels of DCD can precisely be estimated quantitatively.

Impact of DCD

The toxicity of DCD is still unclear. The possible reason for the lack of comprehensive information on the toxicity of DCD would be due to non-existence of direct ingestion path ways. Presence of DCD in foods (eg. milk powder) drew attention very recently. Now the time has come to establish safe limits of DCD. Nevertheless, it is unavoidable the time required to set up a maximum residue level (MRL) of DCD. In such crux of matter, the best choice, as consumers would be to make sure that there is no DCD in any consumer product. If the consumer is in doubt whether the products purchased have been tainted with DCD or any other chemical(s), he/she should be wise enough to reject such products under any circumstances.

Our Responsibility

Before concluding the article, it is worth to mention that our lives are being trapped in complex customs and systems over the years. None can assure the safety of the food we consume at any strength of scientific knowledge. Through the diverse approaches, our lives are invaded by intentionally and unintentionally adulterated food. The bitter truth we experience through alarming growth of non-communicable diseases (NCD) such as cancers, heart attacks, kidney diseases with known and unknown etiology, sub fertility are some of the evidences of ourselves. There are no life savers other than us. The strength we have and the right we possess (customer right) need to be recognized individually and be acted on it collectively. It is important to draw the consumers' suspicious attention to any food prior to purchase. The consumer has the total right to reject if it is unsuitable for consumption. The DCD issue could be the most recent opportunity given us to open the eyes for a customer centered culture.

References:

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