A Study on Production, Characteristics and Disposal of Whey in and Around Raipur City

(Pollution Due to Discharge of Whey)

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Abstract- **During the preparation of heat acid coagulated milk products like** *chhana, paneer, rasogulla, sandesh* **etc. considerable quantity of whey is disposed which has milk solids like fat, protein, lactose etc. Due to the presence of high organic matter content, its disposal poses a serious problem of environmental pollution. An attempt is made to study on production, characteristics and disposal of whey in an around Raipur city. Six reputed shops were identified for this purpose. It has been observed that one shop producing approximately 400 to 600 litre whey daily. The average characteristics of whey found as total solids 6.4%, fat 0.4%, lactose 4.8%, protein 0.4%, acidity 0.25% with Bio-chemical Oxygen Demand of 36000 mg/l. It has been found that almost all whey discarded without any treatment. Dairy industry in India is growing at fast rate and with this progress the quantity of whey produced by dairy industry is also increasing. If such dairy waste is disposed off without taking any care and treatment, it will create intense environmental hazards. Therefore planned collection of whey, its transportation, treatment and disposal is an important component to ensure public health and environment.**

Keywords- Biological Oxygen Demand, Whey, Pollution, Composition of whey, dairy waste.

I. INTRODUCTION

Disposal of dairy waste is becoming a big problem for dairy industry. Dairy in India is growing at a fast rate. With this progress the quantity of waste produced by dairy industry is also increasing. If such dairy waste is disposed off without taking any care and treatment, it will create an intense environmental hazard which will prove to fatal for fish and other aquatic life. With an increase in the production of cheese and coagulated milk products, utilization of whey is becoming a big question mark. Due to the presence of high organic matter content of whey, its disposal poses a serious problem of environmental pollution. The Biological Oxygen Demand (BOD) of whey varies from 39,000 to 48,000 mg/l which is roughly 200 times more as compared to domestic wastage. In addition it also acts as a source of bacteriophage contamination leading to failure of starter culture used for making cheese and other fermented milk products.

Whenever, this waste is mixed with rest of the stream coming out of the different section BOD will be of the order of 3000-4000 mg/l. This needs efficient effluent treatment plant with 90 per cent efficiency. The presently available effluent treatment plants are costly as well as not so effective. Obviously, development of any process for economic utilization would be of great benefit to the dairy industry. Till date, no specific method has been developed for disposal of this high strength dairy waste. To keep this problem in mind present research work was taken up to find out a suitable and cheeper method, so that treatment of dairy waste would be most economical and convenient.

II. MATERIALS AND METHODS

A total of five market samples were collected from different shops, stored at 5°C and analysed as soon as possible. The moisture and total solids were determined by standard gravimetric method [1]. Fat and protein content were determined by Gerber method and micro-Kjeldhal's method respectively [2]. Lactose was determined by the method of Lane and Eynon [2]. Ash content and acidity were determined by the standard method [3]. The original Winkler's method [4] with slight modification was used for determination of oxygen. It depends on the precipitation of the white manganous hydroxide by the dissolved gas. When dissolved in sulfuric acid the manganic sulphate releases free iodine which can be titrated with standard thiosulphate.

TABLE I COMPARATIVE STUDY OF COMPOSITION OF *CHHANA* WHEY SAMPLES IN AND AROUND RAIPUR CITY

No.	Lactose, %	Fat, %	Protein, %	Acidity, %	TSS, %	BOD, mg/l
1	5.0	0.35	0.30	0.30	6.4	37,000
2	4.7	0.40	0.33	0.30	6.4	37,000
3	4.2	0.40	0.40	0.20	6.5	38,000
4	5.1	0.45	0.45	0.20	6.3	31,000
5	5.0	0.40	0.50	0.25	6.4	37,000

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III. RESULTS AND DISCUSSION

The present investigation was carried out to assess the actual load condition. The analytical data of the sample of whey analyzed are given in Table 1. The moisture, fat, protein, carbohydrate, ash and acidity percentage slightly were varied from shop to shop. This was attributed to the difference in fat content of milk, type of coagulant used, processing and other factors. Table 1 also shows that the BOD varied from 37,000 to 39,000 mg/liter with an average value of 38,000 mg/liter. Among the dairy waste, whey perhaps is the single largest pollutant (4-5%) of the total waste [5]. One m^3 of whey is able to produce pollution equivalent to that caused by approximately 600 people [6]. This is an alarming situation and hence it requires special attention for its disposal. The tendency of small entrepreneurs to discharge untreated whey would create an oxygen deficiency smell nuisance and toxicity to aquatic life.

IV. CONCLUSION

Although whey treatment and disposal is important but it is given low priority due to limited financial resources and competing demands. Therefore, planned collection of whey, its transportation, treatment and disposal are important components in the protection of public health and environment.

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