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Assessment of feed supplement additive for production improvement in dairy cattle

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Abstract
Farmers in Dharmapuri mainly depends dairy cow for livelihood. Milk production is the major income generation activity and employment to the rural poor. Cross breeding of dairy cattle boost higher milk production with high biomass forages, 24 dairy cow irrespective of breed and state of lactation, 6 animals per group, milk yield, milk fat, SNF, acidity, protein, lactose and CLR were recorded. The result showed mixture of Sodium bicarbonate ($NaHCO_3$)) (SB) and yeast bolus had significantly increased milk production and quantity of daily milk yield and lactose and non significate changes in SNF, acidity, protein than sodium bicarbonate and yeast supplementation alone.

Keywords: Sodium bicarbonate, yeast, milk yield, milk fat and solid non fat

Introduction
Feed supplement in dairy cattle could be an excellent toll to enhance digestibility and absorption results in increased milk yield by planned feeding schedule. Poor genetic potential of native cows, increase disease tolerance, parasite disease, unaware about loan services, unavailability of quality feed, low plane of nutrition are the major factor contributing to production loss (Abdi, 2022) [1]. Medicated feed additives include antibiotics, antimicrobials, anti-coccidials, antiparasitics, sulfonamidics, hormones, anti-bloat compounds and beta-agonists are the various medicated feed additives used for feed supplement. Some other non medicated feed additives include enzymes, phytogenic and prebiotics also used for animal feed supplement. Feed supplement could be useful for reducing greenhouse gas emissions, antibiotic usage and increasing animal health and efficiency. Powder form of Sodium bicarbonate (SB) was supplemented in dairy cattle feed at the beginning of production. It increased feed intake and milk yield in early lactation fiber digestibility, maintained rumen pH (6.6 to 6.8) when added to diets based on corn silage as the forage @ 07 T_0 1.5 percent of dry matter. Subsequently SB supplement in feed can maintain normal milk fat when grain over load. Increased milk fat synthesis could be achieved by improving rumen environment for cellulolytic bacteria shifts into rumen results in fermentation of acetic acid production. Rumen pH stabilized by dietary supplementation of sodium bicarbonate (Meschy *et al*., 2004) [8] and increased milk yield and milk fat (Musa *et al*, 2017) [9]. Supplementation of Prebiotics substances can selectively stimulate the growth of favorable microbial species in the gut to the benefit of the dairy cattle. Probiotic favors the growth of normal gut bacteria of the gastro intestinal system of cow which stimulates the digestion, absorption and prevents enteric disorders. It helps to balance the populations and activities of microbes in the Gastro intestinal tract (GI) and provide favorable benefits to the host. In Post weaning of dairy calves probiotic have shown better feed efficiency and weight gain ((Hansunuma *et al*., 2011) [4]. Probiotic are nonpathogenic microbes that occur in nature and function in the gastrointestinal tract of ruminents (Dunne *et al*., 1999) [11] and it can be used as alternative to antibiotics to improve animal health and productivity (Allen *et al*., 2013)
Minerals are structural elements in animals. They are available in in bones, vitamins, enzymes, amino acids body fluids and body tissues. Physical, chemical and biological function of the body requires mineral involvement. Poor fertility, general emaciation, and low productivity leads to lack of adequate amounts of minerals. Animals should be supplemented with minerals in proper proportions and quantities. This is because the ratio of minerals in feeds determines the degree to which individual ingredients are of use or harm to the animal. Excess intake minerals, can cause poisoning in animals. Calcium, phosphorus, potassium, sodium, chloride, cobalt, iodine, manganese and fluorine are the major mineral of the animals, some mineral

requirements are meet out from forages and naturally occurring earth licks. However mineral Licks and compounded feeds are useful sources of supplemental minerals. That can either be organic/biological or inorganic/geological sources. The sources include green plants, earth licks, and compounded feeds. Common salts and salt licks for animal consumption are useful mineral supplements. Common salt are useful to livestock diet but not fulfill the mineral requirement.

Materials and Methods

The trial was conducted in 2022 on crossbred cows at Dharmapuri district. Twenty four cows for the trial were selected and divided into 4 groups with 6 cows in all the groups with same management condition. T_0-Concentrate (control), T_1- concentrate+ 50 g of sodium bi carbonate (SB), T_2- concentrate+ 2 bolus of live yeast (YB), T_3- concentrate+ 50 g of sodium bi carbonate (SB)+ 2 bolus of live yeast (YB). The trial lasted for 30 days, taking 10 for standardization and acceptance of the test according to treatment combination experimental animals. Afterwards 10 days milk yield, milk composition, dung score were recorded. Cows were fed CO_5 grass 25 kg/ day+ paddy straw 6 kg/animal/day as per recommendation. All animals were fed commercial concentrate feed and after 10 days of adaptation, milk sample were collected at morning and evening for the period of 10 days to assess milk production (lit/cow/day), milk fat percentage, solid non fat percentage of the milk, incidence of acidosis and economic.

Table 1: Production performance of dairy cows

Particulars	Milk Production (lit/cow/day)	Milk Fat (%)	Milk Solid non fat (%)	Incidence of acidosis
T_0	8.50±2.28	3.93±0.20	8.05±0.05	0.33±0.47
T_1	9.60±3.08	4.08±0.23	8.07±0.05	0.00±0.00
T_2	8.17±3.60	4.00±0.23	8.05±0.05	0.33±0.47
T_3	11.37±3.35	4.27±0.11	8.07±0.05	0.00±0.00
Remarks	S	S	NS	S

S= significant, NS=Non significant

Table 2: Assessment of milk parameter

Treatment	CLR	Acidity	Protein	Lactose
T_0	1.0380	0.163	3.673	4.027
T_1	1.0370	0.162	3.655	4.064
T_2	1.0370	0.161	3.682	4.518
T_3	1.0370	0.163	3.664	4.445
Remarks	NS	NS	NS	S

Results and Discussion

Assessment of sodium bicarbonate, yeast bolus and mixture of sodium bicarbonate and yeast cultures bolus on milk yield, milk fat and solid nonfat (SNF) percentage was accorded with the findings of Musa *et al*., 2017 [9]. Yeast supplementation is highly effective when diet have low protein and high energy (Masek *et al*., 2008) [8]. Dried yeast supplementation in the diet has not significantly improved milk production and composition of milk (Kalmus *et al* 2009) [5]. Present study dairy cow supplement SB, SB+YB and YB significantly increased milk fat percentage than control animal. SB and YB combination significantly increased milk fat percentage of milk over T_1, T_2 and T_0 but no change in SNF percentage. Muthusamy *et al*. 2021 [10] observed dietary supplementation of sodium bicarbonate and yeast bolus significantly increased milk fat percentage in dairy animal which concurred with the present findings but differed with present study of dietary supplementation of sodium bi carbonate non significantly increased milk fat percentage in dairy animal (Bach *et al*, 2018) [2].

Supplementation of sodium bicarbonate non significantly increased lactose and protein percentage but decreased milk fat percentage and no change in milk composition (de ondarza *et al*., 2010) [3]. Yeast supplementation increased milk production by decreased milk fat percentage compared to control group (Maamouri *et al*., 2014) [6]. Multiple study analysis of dairy cows supplemented with yeast slightly decreased protein percentage and milk fat compared to control (de ondarza *et al* 2010) [3]. Higher milk yield was noticed in T_1, T_2 and T_3 compared to control (T_0). Among the treatment group T_3 (SB+YB) was noticed significantly higher milk yield compared to other groups. The finding of the in this study was contrary with the findings of Bach *et al*. (2017) [2] He stated that dietary supplementation of sodium bi carbonate and magnesium oxide decreased milk yield per lactation. Higher level of lactose noticed in T_1 than T_2 followed by T_3 compared to control and non-significant CLR, Acidity, protein was noticed T_1 than T_2 followed by T_3 compared to control.

Conclusion

In the present study sodium bicarbonate and yeast combination significantly increased milk fat lactose and milk yield without significant changes in Protein, acidity, SNF and CLF, acidity. The result also revealed that higher impact of sodium bicarbonate and yeast combination on lactose and milk production than probiotic and bicarbonate alone, Milk fat tend to be higher in SB+YB treated groups than probiotic and bicarbonate alone on milk yield and lactose than bicarb, fat presented its composition. The results also revealed that sodium bicarbonate and probiotics combination achieved higher milk yield and lactose than probiotic and bicarbonate alone

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