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Effects of Feeding Sodium Bicarbonate and Multi-Strain Probiotics on Milk Yield and Milk Composition of Lactating Holstein Frizian Crossbred Cows

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Abstract
A trial was conducted on Twelve (12) Holstein frisian crossbred lactating cows to compare the effects of sodium bicarnate (bicarb) multi-strain probiotics (probiotics) and their interaction on milk yield and milk composition. The cows were grouped in to four (4) with three (3) cows in each treatment group. They were fed according to treatment group viz: T0 compounded feed (control), T1 compounded feed + 120g sodium bicarbonate, T2 compounded feed + 10g probiotics and T3 compounded feed + 100g sodium bicarbonate + 5g probiotics. The experiment lasted for a period of 21 days including 10 days adaptation period. Data were statistically analyzed, mean fat percent was significantly (p>0.05) on T1 than T0 followed by T3 and T2. Milk yield and lactose were also significantly increased (p>0.05) by inclusion of probiotics, interaction of probiotics + bicarb than control group. However, milk acidity, protein percent, SNF and CLR was not significantly influenced by test ingredient. The results indicate interaction of bicarb + probiotics did not have any unique influence on milk yield or its composition as compared to individual test ingredients in different treatment.
Keywords: *sodium bicarbonate, multi-strain probiotics*

Introduction

The genetic potential of today's dairy cows is very high and still increasing. That is why feed and feeding strategies are becoming more and more important. It is well known that the amount of milk produced is highly influenced by the amount and quality of the feed given to the cow. It is also possible to influence milk yield and its composition through feeding. As the cow normally experiences a shortage of nutrients in early lactation due to increase in milk yield, it is important to feed the cow a well balanced diet and maximize the dry matter intake. An unbalanced diet increases the risk of metabolic disturbances and weight loss, which have a negative effect on milk yield and its composition. In order to achieved the desired goals, nutrient density must be elevated through increased grain proportions providing necessary energy. Milk production per cow continues to increase 2 to 3 percent annually. Genetic improvement accounts for 33 to 40 percent of this increase while feeding and management contributes the remaining 60 to 67 percent **(Chase, L.E. 1999).** Scarcity of high quality forage often results in feeding high grain diets to meet the energy requirements of lactating dairy cows. High yielding dairy cows received substantial amount of concentrate containing a high proportion of starch in their diets. Starch ferments quickly in the rumen resulting in a drop in pH and if not controlled, result to sub-acute acidosis. As the proportion of grain in the diet increases, rumen pH, rumen acetate:propionate ratio and milk fat percentage decreases. Rumination and salivation are also reduced as a result of reduced dietary fiber intake. The ruminant animal has a complex acid-base regulating system with the rumen varying in pH from 5.5 to 7. The suggested optimum range of pH for maximum cellulose digestion is 6.4 to 6.8. When rumen pH is at 6.5, 40% of the NDF in the diet would be digested, while at pH 5.5 digestion is less than 20%, and at pH 5 there is essentially no NDF digestion. If rumen pH is not optimal, dry matter intake decrease, acidosis can cause health problems, and microbial yield of protein and energy decreases **(Waje et al., 2010).** According to **Mertz et al. (2009)** the use of feed additives such as (sodium bicarbonate and probiotics) will be helpful in maintaining optimum rumen environment, improve growth and performance of microbes which have beneficial effects on health, growth, production and performance to the host animal. Sodium bicarbonate or sodium hydrogen carbonate is the chemical compound with the formula $NaHCO_3$. Sodium bicarbonate is a white solid that is crystalline but often appears as a fine powder. Sodium bicarbonate has many related names such as baking soda, bread soda, cooking soda, bicarbonate of soda, or shortens to sodium bicarb, bicarb soda, or simply bicarb. Sodium bicarbonate is use to treat acid ingestion and use to treat metabolic acidosis and is used as a buffering agent for the rumen. Sodium bicarbonate is added to the diet to replace endogenous deficiencies in saliva production, which can occur when cows consume a high grain diet. **Mertz, et al. (2009)** reported that rumen pH decreases when cows in high producing herds are fed highly fermentable carbohydrates, in transition dairy cows, in cows in peak lactation with high dry matter intake, and in cows at peak milk production. Acid neutralizing capacity can vary significantly with different physical and chemical characteristics of dietary buffers and alkalizing agents. Some buffers/alkalis dissolve within minutes after entering the rumen, others dissolve so slowly that they largely pass from the rumen before dissolving. Ideally, buffers or alkalis should either be released during the interval of most severe acid production in the rumen, or they should provide a continuous release to prevent fermentation-related increases in free proton, H^+ concentration from becoming detrimental to fiber digestion. **Ondarza, B (2006)** found that sodium bicarbonate supplementation maintained stable rumen pH over longer period of time; as well she found improved milk production and milk fat. However, the benefits from sodium bicarbonate and other buffers/alkalis were most beneficial in high grain diets and early lactating cows. Probiotics is whole food based supplement of live microorganisms, which benefits the host animal by improving its intestinal microbial balance. Typically, they consist mostly of a combination of fungi (e.g. Yeast) and or rumen and intestinal bacteria and aims to promote a balance of the microbial flora, providing a more efficient digestion of nutrients and then improving the processing of food transformation in milk and meat without these microorganisms are adsorbed and retained in the tissue **(Vieira et al., 2014).** Probiotics are non-pathogenic microbes that occur in nature and function in the gastrointestinal tract of ruminants **(Dunne et al., 1999).** Currently, the use of probiotics additives has been developed as alternatives to antibiotics to improve animal health and productivity **(Allen et al., 2013).** Probiotics/prebiotics have the ability to modulate the balance and activities of the gastrointestinal (GI) microbiota, and are thus considered beneficial to the host animal and have been used as functional foods. Numerous factors, such as dietary and management constraints, have been shown to markedly affect the structure and activities of gut microbial communities in livestock animals.

Literature review

McKtNNoN et al. (1999) conducted a feeding trials two 4 x 4 Latin square to investigate the influence of 0.75% sodium bicarbonate (NaHCO), 0.75% potassium bicarbonate (KHCO,) and 0.66% ammonium chloride (NH4Cl) on production and acid-base parameters of dairy cows. Buffer supplementation did not improve feed intake or milk production compared to the control ration of 50% concentrate, 50% barley silage (DM basis). Apparent digestibility of dry matter, acid detergent fiber and crude protein were not influenced by treatment. Buffer supplementation resulted in an increase in milk fat and total solids content in trial 2 but not in trial 1 . In comparison to the two buffered rations, NH_4C1 induced a mild form of acidosis as evidenced from reduced ($P<0.05$) blood pH, HCO3, BE and urine pH values in trial I and blood HCo, and urine pH in trial 2. In addition, DM and concentrate intake were reduced in trial 2 with NH,rCl supplementation. Treatment did not affect the molar proportions of the major rumen volatile fatty acids (VFA). It is concluded that milk fat production did not respond as expected to buffer supplementation due to a failure to influence the pattern of rumen VFA production. The control ration did not stress the acid-base homeostasis of the animal. Consequently, buffer supplementation did not lead to any improvement in systemic acid-base status. Eight Holstein cows were distributed in two 4x4 Latin square. The diets were based on corn silage, concentrate and the treatment (0, 3, 6 or 9 grams of probiotics/animal/day). It was evaluated the dry matter intake of nutrients, milk yield and composition. ($p>0.05$) neither the daily milk production or corrected to 4% fat ($p>0.05$) were improved. However, it was observed that there was a significant fall in milk composition with higher levels of probiotics supplementation. These results emphasize the need of further studies with different experimental designs or improve the number of Latin square with longer periods of adaptation **(Raeth-Knight, M. L. et al., 2007). Der Bedrosian M. C. (2009)** use twenty-eight lactating Holstein cows to compare the effects of feeding live yeasts and sodium bicarbonate, on metabolic indices, digestibility of the total mixed ration (TMR), milk production and composition for a period of 28 days taken last 7 days for data collection and analysis. He revealed that cows fed sodium bicarbonate but not yeasts consumed more dry matter than those fed the un-supplemented diet. There was no difference in milk production, 3.5% fat corrected milk, energy corrected milk, or milk components among treatments but the concentration of milk urea nitrogen was greatest for cows fed sodium bicarbonate. Feed efficiency was lower for cows fed sodium bicarbonate or yeasts when compared to those fed the unsupplemented diet. The addition of yeasts or sodium bicarbonate to the diets of lactating dairy cows did not affect the pH of ruminal fluid, feces or urine, or concentrations of serum amyloid A or haptoglobin in blood. Cows supplemented with sodium bicarbonate had lower organic matter and dry matter digestibility of the TMR compared to other treatments. The digestibility of neutral detergent fiber was lower for cows fed sodium bicarbonate than those fed the un-supplemented TMR but similar to cows fed live yeasts. The digestion of crude protein was lower in supplemented than un-supplemented diets.

Definition of the problem

Scarcity of high quality forage often results in feeding high grain diets to meet the energy requirements of lactating dairy cows. High yielding dairy cows received substantial amount of concentrate containing a high proportion of starch in their diets. Starch ferments quickly in the rumen resulting in a drop in pH and if not controlled, result to sub-acute ruminant acidosis (SARA). As the proportion of grain in the diet increases, rumen pH, rumen acetate:propionate ratio and milk fat percentage decreases. Rumination and salivation are also reduced as a result of reduced dietary fiber intake. Having such condition, the necessity to carry out a trial for possible solution which brought to a topic title "Effects Of Feeding Sodium Bicarbonate And Probiotics On Milk Yield And Milk Composition On Lactating Holstein Frizian Cross Bred Cows" Feed additive have been shown to have beneficial effects under a wide range of applications in ruminants. According to **Mertz el. al., (2009)** the use of feed additives such as (sodium bicarbonate and probiotics) will be helpful in maintaining optimum rumen environment for non pathogenic microbes, improve health, growth, production and and general performance of the host animal.

Materials and methods

The trial was conduct on Holstein frisian crossbred cows at department of animal husbandry & dairying farm, SHUATS. ALLAHABAD. 12 healthy cows were select for the trial and randomly divide into 4 groups with 3 cows in each group. They were kept under same management condition. Ration offered are:

Treatment	**Test ration**
T0	Concentrate (control)
T1	Concentrate + 120g sodium bicarbonate
T2	Concentrate + 10g probiotics
T3	Concentrate + 100 sodium bicarbonate + 5g probiotics

Experimental period:

The trial lasted for 21days, taking 10days for standardization and acceptance of the test ration according to treatment combination experimental animals. Thereafter, 11days milk yield and milk compositional analysis were recorded.

Feeding of animals:

All cows are maintained under same management condition to checkmate error due environmental variation. Test ration and control were fed according to treatment groups.

Roughage:

Cows were fed green sudan grass @ 21kg + dry wheat straw @ 5kg per animal per day as per recommendation.

Concentrates:

Concentrates were given for maintenance purpose @1kg per day per cow and 1kg for every 3kg milk produce.

Composition of concentrate:

Concentrate consist of 15.5% maize, 25.9% de-oiled rice bran, 20.7% de-oiled mustard cake,15.5% wheat bran,10.3% arhar chuni,10.3 broken rice,0.21% trace minerals, 1% common salt, 0.52% soda. Cows under T_0 will be fed normal compounded ration, T_1 will be fed compounded ration + 120g sodium bicarbonate to each cow per day, T_2 will be on compounded ration + 20g probiotics to each cow per day, T_3 will be fed compounded ration + 100g sodium bicarbonate + 10g probiotics per day.

Parameters observed:

After 10days for adaptation, milk sample were collected at morning milking 3:00 to 4:30am and 1:00 to 2:30pm for the period of 11days to determine.

1. Milk yield (kg)
2. Milk fat percentage
3. Solid not fat percentage of the milk
4. Correct lactometer reading
5. Lactose
6. Protein
7. Acidity

Milk sample collection:

200ml milk samples were collected each from the 12 cows selected in conical flasks and immediately plugged aseptically with cotton plugs. The samples were taken to laboratory for analysis of the above mention parameters.

Milk yield (kg):

Milking was done in the morning at 3:00 – 4:00am and afternoon at 1:00 – 2:00pm and recorded daily.

Results and discussion

Table1 shows data regarding milk yield obtained from 4 treatment groups. The treatment mean of milk yield values range between 3.127 to 3.773 as observed in this trial were significantly difference ($p>0.05$) among the treated and control groups with T_0 (control) having 3.127, T_1 (120g bicarb) 3.173, T_2 (10g probiotics) 3.773 and T_3 (100g bicarb + 5g probiotics) 3.555. Highest value was observed in T_2 followed by T_3 with least values in T_0 and T_1, the overall result shows that feeding probiotics influenced milk yield as compared to bicarb group which had slightly increased and is negligible over control group. This indicate feeding probiotics up to 10g yield more milk and remain effective. The result of this experiment is supported by many authors among are **Wohlt et al. (1991); Robinson and Garret (1999); Wang et al. (2001)** on cows fed with Saccharomyces cerevisiae. **Nocek et al. (2003)** observed an increased dry matter intake (2.6 kg/day) and increased milk yield (2.3 kg/day) with the same combination of probiotics offered from 3 weeks pre-partum to 10 weeks post-partum. In a very similar trial using 44 Holstein cows **Desnoyers et al. (2009)** reported increased in milk yield, by (+1.2 g/kg of BW) but no changes in milk protein content. However, some other researchers **(Erdman and Sharma, 1989; Arambel and Kent, 1990; Kung et al., 1997; Boga and Gorgulu, 2007; Weiss, Wyatt and McKelvey 2008.)** have not found probiotics administration to increase the milk production in cows.

Table 1 Average daily analysis of milk yield effects of sodium bicarbonate and probiotics

Replication/days	Average milk yield Treatment			
	T_0	T_1	T_2	T_3
1	3.4	3.2	3.0	2.8
2	3.2	3.3	3.3	3.0
3	3.0	3.0	3.5	3.1
4	2.6	2.8	3.6	3.3
5	2.8	2.6	3.4	3.5
6	3.1	2.8	3.7	3.4
7	3.7	3.3	4.0	3.6
8	2.9	3.0	4.2	3.6
9	3.1	3.6	4.3	3.8
10	3.3	3.3	4.2	4.0
11	3.2	3.4	4.3	4.0
Mean	3.127	3.173	3.773	3.555

Table 2 present data on average daily and mean analysis of milk acidity. The mean values of milk acidity recorded in present experiment were 0.163, 0.162, 0.161 and 0.163 for T0 (control), T1 (120g bicarb), T2 (10g probiotics) and T3 (100g bicarb +5g probiotics) respectively. The results did not differ significantly among the treatment group is within the normal range. This indicate bicarb and probiotics or their combination did not increased lactic acid content but rather support the growth and development of lactic acid utilizing microbes in the

rumen. The result in-line with the report of **Krishnamoorthy and Krishnappa (1996)** who found no differences in DM intake, body weight gain, milk yield and milk composition when yeast was added in a diet based on finger millet (Eleusine coracana) straw for lactating crossbred cattle. **Hossain et al. (2014)** also conducted an experiment on ten multiparous cows fed Saccharomyces cerevisiae and did not observed any effects on acidity of milk.

Table 2 Average daily analysis of acidity effects of sodium bicarbonate and probiotics

Replication/days	Acidity Treatment			
	T_0	T_1	T_2	T_3
1	0.16	0.16	0.16	0.17
2	0.16	0.16	0.16	0.17
3	0.17	0.16	0.16	0.16
4	0.17	0.17	0.16	0.17
5	0.16	0.16	0.16	0.16
6	0.17	0.16	0.17	0.16
7	0.16	0.16	0.16	0.16
8	0.16	0.16	0.16	0.16
9	0.16	0.17	0.16	0.16
10	0.16	0.16	0.16	0.16
11	0.16	0.16	0.16	0.16
Mean	0.163	0.162	0.161	0.163

Table 3 present data on average daily and mean fat percent of milk, data obtained on milk fat percent were significantly influenced ($p>0.05$) by test ingredient over control group. The mean values were 3.255, 5.009, 3.564 and 4.691 for T_0 (Control), T_1 (120g bicarb), T_2 (10g probiotics) and T_3 (100g bicarb + 5g probiotics) this revealed the significance of the test ingredient on milk fat percent. However, T_1 tend to be higher followed by T_3, T_2, with least value in T_0. Though probiotics increase milk fat percent but bicarb tend to be higher. This indicates the effectiveness of bicarb over probiotics on milk fat percent. The results in agreement with the report of **Ondarza, B (2006)** found that sodium bicarbonate supplementation maintained stable rumen pH over longer period of time; as well she found improved milk production and milk fat. However, the benefits from sodium bicarbonate and other buffers/alkalis were most beneficial in high grain diets and early lactating cows.**Wang et al. (2001)** also observed a significant increased in milk fat content in cows in early lactation during supplementation of yeast culture. **Ramanathan A. and Venkata Narasimham K. (2013)** conducted a feeding trial on eight cows to compare the effect of supplementing commercial yeast Saccharomyces cerevisiae and Saccharomyces

siccum on milk yield and mil composition. A significant increased ($p<0.05$) in milk yield, mean milk fat, protein and total solids content in both the treatment group during supplementation of yeast was observed when compared to the pre supplementation value.

Table 3 Average daily analysis of fat effects of sodium bicarbonate and probiotics

Replication/days	Fat Treatment			
	T_0	T_1	T_2	T_3
1	3.3	4.4	3.4	3.7
2	3.1	4.7	3.5	4.5
3	3.0	4.8	3.4	4.2
4	3.2	5.1	3.6	4.5
5	3.5	4.9	3.3	4.3
6	3.5	5.2	3.4	4.8
7	3.0	5.1	3.5	5.0
8	3.4	5.0	3.7	5.1
9	3.0	5.3	3.6	5.3
10	3.5	5.2	3.8	5.0
11	3.3	5.4	4.0	5.2
Mean	3.255	5.009	3.564	4.691

Table 4 gives detail data on protein recorded. The average mean values of this present experiment ranged between 3.655 to 3.682 across the treatments groups falls within the normal range of 3.3 to 3.9%, no significance difference ($p>0.05$) was observed. Neither bicarb nor probiotics or their combination influenced protein content in the milk. Same results were noticed by some previous authors **(Giger-Reverdin et al. 1996; Marius 2007; Stella et al., 2007). Desnoyers et al. (2009)** found that yeast supplementation increased milk yield (+1.2 g/kg of BW) but had no influence on milk protein content. **Clayton et al. (1999)** fed virginiamycin and sodium bicarbonate ($NaHCO_3$) to study their effects on ruminal and fecal pH, rumen volatile fatty acid proportions, blood metabolites, milk production and composition were assessed. Revealed that milk fat and milk protein percentage did not differ significantly as a result of dietary treatment.

Table 4 Average daily analysis of protein effects of sodium bicarbonate and probiotics

Replication/days	Protein Treatment			
	T_0	T_1	T_2	T_3
1	3.6	3.6	3.6	3.6
2	3.6	3.6	3.6	3.6
3	3.8	3.6	3.9	3.9
4	3.6	3.6	3.7	3.6
5	3.6	3.6	3.8	3.6
6	3.7	3.7	3.6	3.6
7	3.8	3.6	3.6	3.6
8	3.7	3.7	3.6	3.7
9	3.6	3.7	3.7	3.6
10	3.7	3.8	3.7	3.8
11	3.6	3.7	3.7	3.7
Mean	3.673	3.655	3.682	3.664

Table 5 present data analysis of lactose. The average mean value obtained in this experiment was 4.027, 4.064, 4.518 and 4.445 for T0, T1, T2 and T3 viz. The results of T2 and T3 show significant increased ($p<0.05$) lactose content in cows milk fed probiotics and interaction of probiotics + bicarb. The results indicate increased in lactose content in cows fed probiotics and interaction of probiotics + bicarb compared to those supplemented with bicarb which remained almost equal with control group. The result agrees with the report of **(Triantos A. 1991)** used eighteen multiparous Friesian cows to study effects of sodium carbonate on milk yield, milk composition, blood metabolites plus Na, and K in early lactation. Diets were concentrates containing either 0 or 1.2% sodium carbonate (as fed) for ad libitum intake plus 7.0 kg of wet brewer grains and 5.5 kg of long-stemmed alfalfa hay per cow daily. Observed that the dry matter intake, milk yield, milk protein percentage and yield, and percentages of milk lactose and milk SNF was not significantly affected. Compared with the control diet, the sodium carbonate treatment increased milk fat percentage (3.98 vs. 3.53%) and yield (1.23 vs. 1.07 kg/d), 4% FCM yield (30.9 vs. 28.2 kg/d) and milk total solids (12.47 vs. 12.04%). **Iwanska et al. (2000)** studied the effect of fungal probiotics and their beneficial effects of biologically active compounds on milk yield and composition. Data obtained on thirty multiparous Polish Black and White cows indicate that fat corrected milk yield, milk fat yield, milk protein yield, casein yield, lactose percentage, total solid, solid-not-fat and somatic cell count were significantly higher than the control group. However, some researchers contradict the results among are. **Marius (2007)** did not observe response on milk protein levels as well as milk lactose percentage when dosage of probiotic was fed.

Table 5 Average daily analysis of lactose effects of sodium bicarbonate and probiotics

Replication/days	Lactose Treatment			
	T_0	T_1	T_2	T_3
1	4.2	4.0	4.1	4.0
2	3.9	4.1	4.1	4.2
3	4.0	3.9	4.3	4.4
4	3.9	4.1	4.7	4.3
5	4.1	4.0	4.4	4.4
6	4.0	4.1	4.5	4.6
7	4.0	4.0	4.7	4.4
8	3.9	3.9	4.6	4.5
9	4.0	4.2	4.6	4.6
10	4.2	4.1	4.8	4.8
11	4.1	4.3	4.9	4.7
Mean	4.027	4.064	4.518	4.445

Table 6 present data regarding correct lactometer reading (CLR). The treatment mean reading was 1.0380, 1.0370, 1.0370 and 1.0370 for T0, T1, T2 and T3 viz. The result were almost similar with little variation in T1 which is control group but not significant. The result is supported by report of **Der Bedrosian M. C. (2009)** use twenty-eight lactating Holstein cows to compare the effects of feeding live yeasts and sodium bicarbonate, on metabolic indices, digestibility of the total mixed ration (TMR), milk production and composition for a period of 28 days taken last 7 days for data collection and analysis. He revealed that cows fed sodium bicarbonate but not yeasts consumed more dry matter than those fed the un-supplemented diet. There was no difference in milk production, 3.5% fat corrected milk, energy corrected milk, or milk components among treatments but the concentration of milk urea nitrogen was greatest for cows fed sodium bicarbonate.

Table 6 Average daily analysis of correct lactometer reading effects of sodium bicarbonate and probiotics

Replication/days	Correct lactometer reading Treatment			
	T_0	T_1	T_2	T_3
1	1.0363	1.0362	1.0369	1.0369
2	1.0369	1.0368	1.0366	1.0363
3	1.0372	1.0370	1.0361	1.0371
4	1.0377	1.0369	1.0367	1.0371
5	1.0375	1.0371	1.0370	1.0364
6	1.0378	1.0363	1.0371	1.0359
7	1.0372	1.0369	1.0373	1.0366
8	1.0379	1.0378	1.0372	1.0369
9	1.0382	1.0363	1.0375	1.0371
10	1.0380	1.0366	1.0368	1.0377
11	1.0383	1.0370	1.0376	1.0378
Mean	1.0380	1.0370	1.0370	1.0370

Table 7 present data with regard to solid not fat (SNF). Treatment mean of this present experiment was 9.673, 9.664, 9.655 and 9.682 for T0, T1, T2, and T3. The result did not differ significantly. The result revealed neither bicarb nor probiotics or their interaction had influenced SNF content of the milk. Some authors had advocated similar report **Krishnamoorthy and Krishnappa (1996)** found no differences in DM intake, body weight gain, milk yield and milk composition when yeast was added in a diet based on finger millet (Eleusine coracana) straw for lactating crossbred cattle. **Ramanathan A. and K. Venkata Narasimham (2003)** fed Commercial yeast species Saccharomyces cerevisiae and Saccharomyces siccum no significant change was observed in solids not fat content of the milk samples obtained before, during and after supplementation of Saccharomyces cerevisiae as well as Saccharomyces siccum. In contrast, **Vibhute et al. (2011)** selected sixteen multifarious cows on the basis of average daily milk yield and stage of lactation. The multi-strain probiotics used were containing four strains consist of bacteria and fungi namely Lactobacillus acidophilus, Saccharomyces cerevisiae, Saccharomyces boulardii and Propionibacterium frendenreichii. It was found that, the use of probiotics proved to be effective in increasing milk production of lactating cows. Milk fat, milk protein and SNF content tended to be higher in cows supplemented with probiotics preparations. **Hossain et al. (2014)** selected ten multiparous cows to determine the effect of probiotics (Saccharomyces cerevisiae) on milk yield and composition. It was

observed that there was no significant improvement in butter fat percentage of milk (P>0.05) and acidity (%) between treatment group and control group, but significant improvement (P<0.05) was found in protein content and solids-not-fat content of milk.

Table 4.6 Average daily analysis of solid not fat effects of sodium bicarbonate and probiotics

Replication/days	Solid not fat	Treatment		
	T_0	T_1	T_2	T_3
1	9.6	9.6	9.7	9.7
2	9.8	9.7	9.7	9.6
3	9.6	9.6	9.5	9.5
4	9.5	9.8	9.6	9.7
5	9.8	9.8	9.5	9.8
6	9.8	9.5	9.7	9.8
7	9.6	9.5	9.6	9.5
8	9.7	9.8	9.8	9.7
9	9.6	9.5	9.5	9.6
10	9.7	9.8	9.8	9.8
11	9.7	9.7	9.8	9.8
Mean	9.673	9.664	9.655	9.682

Conclusion

Although there are inconsistence report from different authors regarding influenced of bicarb and probiotics, but the overall results of this experiment revealed milk yield, milk fat and milk lactose was significant significantly influenced by the individual test ingredients and their interaction among the treatment groups. However, the interaction of bicarb + probiotics did not yielded any special result when compared to individual test ingredient, signifying interactions of bicarb + probiotics did not have positive effects on milk yield or its composition.

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