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EFFECT OF DIFFERENT VITAMINS AND MINERAL PREMIX SUPPLEMENTATIONS ON MILK YIELD AND COMPOSITION IN DAIRY COWS

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A B S T R A C T

The current research was carried out in a Completely Randomized Design to interpret the effect of different dietary supplementations of vitamins and minerals premix on milk yield, milk composition and blood composition of dairy cows (HF cross Jersey). In the instant study, 4 groups were randomly constructed (A, B, C and D) and a total of 12 dairy cows (HF cross Jersey) having almost same milking stage and age were being divided into these 4 groups, each with 3 animals. Dietary supplementations of vitamins and minerals premix were provided two times a day at the rate of 0, 10, 15 and 20g/kg rations (TMR) according to 3 % body weight of the animals to each group A, B, C and D respectively. Among different treatment the milk production was remarkably different ($P<0.05$). From the result it was confirmed that average milk production (liter/day) was higher 14.4±0.52 (liter/day) with treatment of 20 g/kg ration supplemented with vitamins and minerals premix while it was lower with vitamins and minerals premix-0 (control treatment) (13.6±0.3). Mean milk fat with Vitamins and Minerals premix-20 was (3.74±0.35) while it was lower with dietary supplementations of vitamins and minerals premix- 0 (3.72±0.42). Mean milk protein with Vitamins and Minerals premix- 0 (3.45±0.23), while it was higher with Vitamins and Minerals premix-20 (3.49±0.21). Mean milk total solids (%) with Vitamins and Minerals premix-0 was lower ($10.1±0.31^{c}$) while it was higher (11.7±0.41) with Vitamins and Minerals-20. Mean solid not fat (%) with Vitamins and Minerals premix-0 was (8.2±0.29), while it was lower (7.3±0.38) with Vitamins and Minerals premix-20. Among different treatment the blood profile was remarkably different ($P<0.05$). The average value of blood glucose (mg/dl) was changed. The blood glucose value with Vitamins and Minerals premix-0 was (64.3±0.23) while it was (72.1±0.21) with Vitamins and Minerals premix-20. It was deduced from the current study that high milk production, enhanced glucose and urea % in blood were attributed to dietary supplementation of Vitamins and Minerals premix at 20 g/kg of ration offered two times daily.

Keywords: Milk yield; Milk composition; Glucose; Urea; Premix

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INTRODUCTION

The livestock section plays a crucial role in national agricultural activities. Livestock comprising poultry provides significant amount to the national gross domestic product (GDP). During 2019 to 2020, the livestock section has been declaring a huge share inside the agriculture, providing 58.92 to the agriculture value and about 11.11 % to the national GDP. Furthermore, there are more than 8 million peoples which are directly and indirectly connected with livestock industry. The Economic Survey of Pakistan (2019-20) shows that, the livestock population comprises of 46.1 % Cattle, 38.6 % Buffalo million heads, respectively. In Pakistan cattle are the important dairy animals for milk production. In the world, Pakistan is one of the fourth biggest milk producing nation, producing 57.89 M Tons of milk approximately (Ashfaq et al., 2015). In different parts

of the world cattle play a central role in supplying milk of higher nutritional quality (Al-Shamsi et al., 2018). In Pakistan, total cattle population is 46.1 M which provides 20,903 tons milk yield to the industry.

The diet of high producing dairy cows consist of all the essential nutrients which are required for high milk production to meet the demand of the mammary gland such as carbohydrates, amino acids, fatty acids, vitamins, minerals and water. The nutrients requirement of dairy cattle for optimal milk production, milk composition, reproductive performance and herd health, consist of at least 17 minerals (macro-minerals and micro-minerals) and three vitamins in their diets. Macro minerals include calcium (Ca), phosphorus (P), magnesium (Mg), sulfur (S), sodium (Na), chlorine (Cl) and potassium (K) while the Micro minerals include chromium (Cr), cobalt (Co), copper (Cu), iodine (I), iron (Fe), manganese (Mn), selenium (Se) and zinc (Zn). The overfeeding as well as deficiencies of certain minerals and vitamins can cause some problems like reproductive, health and milk production problems. However, in normal condition the vitamins and minerals deficiency problems are very limited (Boda and Cole, 1956).

In the present study, Biomin vitamins and minerals premix was used as dietary supplementations, which is available in the local market of Peshawar. In prescription, it is mentioned that this product increases milk yield and improves milk composition and blood profile of the animals. Therefore, the current study was designed to find out the effect of different dietary supplementations of vitamins and minerals premix on blood profile, milk production and milk composition of Holstein Friesian cross Jersey cows. The current study was carried out to attain the following key objectives. To find out the effect of different dietary supplementations of vitamins and minerals premix on blood profile of Holstein Friesian cross Jersey cows. To determine the effect of different dietary supplementations of vitamins and minerals premix on milk yield of Holstein Friesian cross Jersey cows. To evaluate the effect of different dietary supplementations of vitamins and minerals premix on milk composition of Holstein Friesian cross Jersey cows.

MATERIALS AND METHODS

Study Location

The present study indicating the Department of Animal Nutrition, The University of Agriculture Peshawar was carried out at Mulazai Dairy Farm, District Peshawar. The evaluation of milk for milk composition and blood profile was carried out at Centre of Animal Nutrition (CAN), Directorate of Livestock Research and Development Peshawar.

Animal and experimental design

In the instant study, 4 groups were randomly constructed (A, B, C and D) and a total of 12 dairy cows (HF cross Jersey) having almost same milking stage and age were being divided into these 4 groups, each with 3 animals as a replicates. The data about these variables were taken from stock register of the farm. All the experimental animals were medicated for ecto and endo parasites before starting the trail. Four mixed diets were formulated as per NRC (2001). Diet A (Routine diet only), diet B (TMR+ vitamins-minerals premix-10g/kg), diet C (TMR+ vitamins-minerals premix-15g/kg) while diet D (TMR+vitamins-minerals premix-20g/kg). Experimental diets were offered to experimental animal two times a day. Trial lasted for 45 days of period including 10 days of adaptation period (Table 1).

Table 1. Experimental Layout of the study.

Groups	Treatments	No. of Animals	Study Parameters
A	TMR-(control)	3	Blood glucose, blood urea nitrogen, milk yield and milk composition (milk lactose, milk fat, milk protein, total solid and solid not fat SNF.)
B	TMR + 10g VMP/kg	3	
C	TMR + 15g VMP/kg	3	
D	TMR+ 20g VMP/kg	3	

VMP-vitamins minerals premix

Data collection

Milk yield

On daily basis, milk productions from each treatment were noted. Before milking the udder was sterilized with cotton swabs soaked in ethyl alcohol. The animals were hand milked twice a day and time of milking was 6:00 am in the morning and 6:00 pm in the evening. The samples collected at morning and evening were merged at 1:1 to obtained a mixed sample. For further examination of milk composition the samples were preserved at 4ºC. Moreover, after this the milk samples were examined for milk lactose, protein, fat, total solid and solid not fat (SNF).

Milk composition

To find out the different component of the milk such as

Milk lactose, fat, protein, total solid and solid not fat, the milk samples were processed at Center of Animal Nutrition, VRI, Peshawar according to procedures of AOAC (1990). For this reason a sample of 10 ml was taken from each animal in a treatment and then mixed all the milk samples of each treatment. According to standard laboratory procedure, the pH of milk samples was measured by using pH meter.

Milk lactose

The milk lactose was calculated by mean of Lactometer. In a graduated cylinder 100 ml of milk was collected at 20ºC from each treatment and then a Lactometer was dipped in a graduated cylinder and milk lactose was recorded.

Milk fat

Milk fat was determined by mean of Gerber procedure. In a butyrometer 10 ml of Concentrated H_2SO_4 was poured and then 11 ml of milk sample and 1 ml of amyl alcohol was slowly added. A cork was placed and then it was transferred to a Gerber machine where it was centrifuged for 3-5 min and reading was taken by adjustment of column.

Milk protein

Milk protein was measured by finding the nitrogen content of the sample by Kjeldahl method. In a kjeldahl flask 5 ml of milk from each treatment was taken with 2.2 g catalyst. After this 25-30 ml of Sulphuric acid (H_2SO_4) was added slowly to the flask and shacked well. Then the sample was transferred to volumetric flask and diluted with 5 ml distilled water, after heating at 400ºC for 30 minute. After dilution it was transferred to Kjeldahl distillation unit and 5 ml of 2 % boric acid and 3-4 drops of methylene red as indicator was added. The ammonia which trapped in boric acid was then titrated with 0.1 m H_2SO_4 and reading was noted.

$$\text{Nitrogen\%} = \frac{1.4\text{x } (V1 - V2)\text{xM}}{W}$$

V1 and V2= titration reading if sample and blank

M= Molality of Suphuric acid

W= weight of test sample

$$\text{Protein \%} = \text{N\% x } 6.25$$

Milk total solids

For the measurement of milk total solid, in a pre-weighed aluminum dish 2-3 ml of milk sample was taken from each treatment. Then placed the aluminum dish in oven at 110ºC for 2-3 hours. After 3 hours the sample was cooled in a desiccator for 15 minute and the dry sample was weighed by mean of digital balance. The milk total solid was calculated as follow;

$$\text{Total solids} = \frac{\text{Weight of dried sample}}{\text{Weight of sample}} \times 100$$

Solid not fat

According to Harding (1995), solid not fat (SNF) in milk was calculated by using the following formula;

$$\text{Solid not fat\%} = \text{Total solid percent} - \text{fat percent}$$

Blood profile

Blood urea and glucose profile were checked at Pathology Laboratory, Veterinary Research Institute Peshawar. In a last week of trial, a blood sample of 8-10 ml without anticoagulant was collected from each treatment in a test tube. The blood test tube was kept at room temperature to make it clot and for half an hour was kept in a refrigerator. When the blood in a test tube become clotted, it was transfer to a centrifuge machine and was centrifuged at 3000 rpm for 20 min. After centrifugation, the serum was collected and for the measurement of blood parameters, it was kept at -20ºC in a refrigerator. For blood glucose the serum was passed out through spectrophotometer and BUN was calculated with the help of commercially available kit.

Statistical analysis

In excel sheet, data was inserted and was determined statistically in a Completely Randomized Design (CRD) by using the analysis statistical program (SPSS). By using the least remarkable difference procedure, the means were compared. The following model was used.

$$Yij = \mu + \beta j + \epsilon ij$$

Yij = Response of the treatment

μ = overall mean effect

βj= treatment effect

Єij= random error

RESULTS

Following are the results on effect of different dietary supplementations of vitamins and minerals premix on milk production, milk composition and blood composition of crossbreeds of Holstein Friesian cross Jersey cows.

Milk yield

The average milk yield (liter/day) of different treatments while feeding different dietary supplementations of vitamins and minerals premix is given in Table 2. Milk yield amongst the treatments was remarkably different ($P<0.05$). The ranged of milk yield with treatment of different dietary supplementations of vitamins and minerals premix is from 13.6 to 14.4 (liter/day). Average milk production at vitamins and minerals premix-0, vitamins and minerals premix-10, vitamins and minerals premix-15 and vitamins and minerals premix-20 g/kg ration was 13.6±0.36, 14.0±0.41, 14.1±0.47 and 14.4±0.52 (liter/day), respectively. Correlation of milk yield amongst different treatment proved that it was higher with vitamins and minerals premix-20 g/kg ration and it was lower with vitamins and minerals premix-0 (Control group). Moreover, by increasing dietary supplementations of

vitamins and minerals premix up to certain extent in diets, as a result the milk yield was also increased.

Table 2. Effect of dietary supplementations of vitamins and minerals premix on milk yield of Holstein Friesian cross Jersey cows.

Treatment	Milk Yield (lit/day) (Means±SE)	Milk urea (mg/dl)	$_{P}$H
TMR (control)	13.6±0.36^{c}	24.5±0.21	6.64
TMR+ 10 g VMP/kg	14.0±0.41^{b}	25.1±0.28	6.71
TMR+ 15 g VMP/kg	14.1±0.47^{b}	26.1±0.19	6.7.5
TMR+ 20 g VMP/kg	14.4±0.52^{a}	25.4±0.23	6.78
P-value	0.05	0.056	0.052

Average with different superscripts within same column is remarkably different at 0.05 significant level; VMP, vitamins and minerals premix

Milk lactose

The average milk lactose (%) of different treatments while feeding different dietary supplementations of vitamins and minerals premix is given in Table 3. Milk lactose amongst the treatments was not remarkably different (P>0.05). The ranged of milk lactose with treatment of different dietary supplementations of vitamins and minerals premix is from 4.81±0.49 to 4.91±0.37 %. Average milk lactose at vitamins and minerals premix-0, vitamins and minerals premix-10, vitamins and minerals premix-15 and vitamins and minerals premix-20 g/kg ration was 4.91±0.36, 4.81±0.41, 4.83±0.47 and 4.84±0.52 % respectively. Correlation of milk lactose amongst different treatment proved that it was higher with vitamins and minerals premix-0 g/kg ration and it was lower with vitamins and minerals premix-20 g/kg. Moreover, by increasing dietary supplementations of vitamins and minerals premix up to certain extent in diets, as a result the milk lactose was decreased.

Milk fat

The average milk fat (%) of different treatments while feeding different dietary supplementations of vitamins and minerals premix is given in Table 4. Milk fat amongst the treatments was not remarkably different (P>0.05). The ranged of milk fat with treatment of different dietary supplementations of vitamins and minerals premix is from 3.72 to 3.75(%). Average milk fat at vitamins and minerals premix-0, vitamins and minerals premix-10, vitamins and minerals premix-15 and vitamins and minerals premix-20 g/kg ration was 3.72±0.42, 3.75±0.37, 3.71±0.22 and 3.74±0.35 (%), respectively. Correlation of milk fat amongst different treatment proved that it was higher with vitamins and minerals premix-10 g/kg ration and it was lower with vitamins and minerals premix-15 g/kg. Moreover, by increasing dietary supplementations of vitamins and minerals premix up to certain extent in diets, as a result the milk fat was also increased. Beyond a certain extent the milk fat (%) decreases with further addition of vitamins and minerals premix.

Milk protein

The average milk protein (%) of different treatments while feeding different dietary supplementations of vitamins and minerals premix is given in Table 5. Milk protein amongst the treatments was not remarkably different (P>0.05). The ranged of milk yield with treatment of different dietary supplementations of vitamins and minerals premix is from 3.41 to 3.48 (%).

Table 3. Effect of dietary supplementation of vitamins and minerals premix on milk composition (Lactose) of Holstein Friesian cross Jersey cows.

Treatment	Lactose % Mean ± SE	P- value
TMR (control)	4.91±0.37	
TMR+ 10 g VMP/kg	4.81±0.49	0.28
TMR+ 15g VMP/kg	4.83±0.51	
TMR+ 20 g VMP/kg	4.84±0.23	

Average with different superscripts within same column is remarkably different at 0.05 significant level; VMP, vitamins and minerals premix.

Table 4. Effect of dietary supplementation of vitamins and minerals premix on milk composition (Milk fat) of Holstein Friesian cross Jersey cows.

Treatment	Fat % Mean ± SE	P- value
TMR (control)	3.72±0.42	
TMR+10 g VMP/kg	3.75±0.37	0.34
TMR+15 g VMP/kg	3.71±0.22	
TMR+20 g VMP/kg	3.74±0.35	

Average with different superscripts within same column is remarkably different at 0.05 significant level; VMP, vitamins and minerals premix

Table 5. Effect of dietary supplementation of vitamins and minerals premix on milk composition (Milk Protein) of Holstein Friesian cross Jersey cows.

Treatment	Protein % Mean ± SE	P- value
TMR (control)	3.45±0.23	
TMR+ 10 g VMP/kg	3.48±0.33	0.23
TMR+ 15 g VMP/kg	3.45±0.28	
TMR+ 20 g VMP/kg	3.49±0.21	

Average with different superscripts within same column is remarkably different at 0.05 significant level; VMP, vitamins and minerals premix

Average milk production at vitamins and minerals premix-0, vitamins and minerals premix-10, vitamins and minerals premix-15 and vitamins and minerals premix-20 g/kg ration was 3.45±0.23, 3.48±0.33, 3.45±0.28 and 3.41±0.21 (%) respectively. Correlation of milk protein amongst different treatment proved that it was statistically similar with all vitamins and minerals treatment in diets (Table 5). Moreover, by increasing dietary supplementations of vitamins and minerals premix up to certain extent in diets, as a result the milk protein was also increased.

Milk total solids

The average milk total solid (%) of different treatments while feeding different dietary supplementations of vitamins and minerals premix is given in Table 6. Milk yield amongst the treatments was remarkably different (P<0.05). The ranged of milk total solid with treatment of different dietary supplementations of vitamins and minerals premix is from 10.1 to 11.7 (%). Average milk production at vitamins and minerals premix-0, vitamins and minerals premix-10, vitamins and minerals premix-15 and vitamins and minerals premix-20 g/kg ration was 10.1±0.31, 10.7±0.37, 11.5±0.21 and 11.7±0.41 (%), respectively. Correlation of milk solid total solid amongst different treatment proved that it was higher with vitamins and minerals premix-20 g/kg ration and it was lower with vitamins and minerals premix-0 (Control group). Moreover, by increasing dietary supplementations of vitamins and minerals premix up to certain extent in diets, as a result the milk total solid was also increased.

Table 6. Effect of dietary supplementation of vitamins and minerals premix on milk composition (total solids) of Holstein Friesian cross Jersey cows.

Treatment	Total solid % Mean ± SE	P- value
TMR (control)	10.1 ± 0.31^{c}	
TMR+ 10 g VMP/kg	10.7 ± 0.37^{b}	0.043
TMR+ 15 g VMP/kg	11.5 ± 0.21^{a}	
TMR+ 20 g VMP/kg	11.7 ± 0.41^{a}	

Average with different superscripts within same column is remarkably different at 0.05 significant level; VMP, vitamins and minerals premix

Solid not fats

The average solid not fat (%) of different treatments while feeding different dietary supplementations of vitamins and minerals premix is given in Table 7. Milk solid not fat amongst the treatments was not remarkably different (P>0.05). The ranged of milk solid not fat with treatment of different dietary supplementations of vitamins and minerals premix is from 7.3 to 8.2 %. Average milk solid not fat at vitamins and minerals premix-0, vitamins and minerals premix-10, vitamins and minerals premix-15 and vitamins and minerals premix-20 g/kg ration was 8.2±0.29, 7.7±0.34, 7.5±0.21 and 7.3±0.38 (%), respectively. Correlation of milk solid not fat amongst different treatment proved that it was higher with vitamins and minerals premix-0 g/kg ration and it was lower with vitamins and minerals premix-20 g/kg. Moreover, by increasing dietary supplementations of vitamins and minerals premix up to certain extent in diets, as a result the milk solid not fat was decreased.

Blood glucose concentration

The average blood glucose (mg/dl) of different treatments while feeding different dietary supplementations of vitamins and minerals premix is given in Table 8. Blood glucose amongst the treatments was remarkably different (P<0.05). The ranged of blood glucose with treatment of different dietary supplementations of vitamins and minerals premix is from 64.3 to 77.3 (mg/dl). Average blood glucose at vitamins and minerals premix-0, vitamins and minerals premix-10, vitamins and minerals premix-15 and vitamins and minerals premix-20 g/kg ration was 64.3±0.23, 68.4±0.19, 77.3±0.14 and 72.1±0 (mg/dl), respectively.

Blood urea nitrogen

The average blood urea nitrogen (mg/dl) of different treatments while feeding different dietary supplementations of vitamins and minerals premix is given in Table 9. Blood urea nitrogen amongst the treatments was remarkably different (P<0.05). The ranged of blood urea nitrogen with treatment of different dietary supplementations of vitamins and minerals premix is from 15.2 to 21.2 (mg/dl). Average blood urea nitrogen at vitamins and minerals premix-0, vitamins and minerals premix-10, vitamins and minerals premix-15 and vitamins and minerals premix-20 g/kg ration was 15.2±0.14, 16.7±0.17, 19.4±0.22 and 21.2±0.31 (mg/dl), respectively. Correlation of blood urea nitrogen amongst different treatment proved that it was higher with vitamins and minerals premix-20 g/kg ration and it was lower with vitamins and minerals premix-0 (Control group). Moreover, by increasing dietary supplementations of vitamins and minerals premix up to certain extent in diets, as a result the blood urea nitrogen was also increased.

Table 7. Effect of dietary supplementation of vitamins and minerals premix on milk composition (solid not fat) of Holstein Friesian cross Jersey cows.

Treatment	Solid not fat % Mean ± SE	P- value
TMR (control)	8.2±0.29	
TMR+ 10 g VMP/kg	7.7±0.34	0.28
TMRt+15g VMP/kg	7.5±0.21	
TMR + 20 gVMP/kg	7.3±0.38	

Average with different superscripts within same column is remarkably different at 0.05 significant level; VMP, vitamins and minerals premix

Table 8. Effect of dietary supplementation of vitamins and minerals premix on blood parameters (Blood glucose) of Holstein Friesian cross Jersey cows.

Treatment	Blood glucose mg/dl Mean ± SE	P- value
TMR (control)	64.3 ± 0.23^{b}	
TMR+ 10 g VMP/kg	68.4 ± 0.19^{b}	0.028
TMR+ 15 g VMP/kg	77.3 ± 0.14^{a}	
TMR+ 20 g VMP/kg	72.1 ± 0.21^{a}	

Average with different superscripts within same column is remarkably different at 0.05 significant level; VMP, vitamins and minerals premix

Table 9. Effect of dietary supplementation of vitamins and minerals premix on blood parameters (Blood urea nitrogen) of Holstein Friesian cross Jersey cows.

Treatment	Blood urea nitrogen Mean ± SE	P- value
TMR (control)	15.2±0.14[d]	
TMR+10 g VMP/kg	16.7±0.17[c]	0.0231
TMR+15 g VMP/kg	19.4±0.22[a]	
TMR+20 g VMP/kg	21.2±0.31[b]	

Average with different superscripts within same column is remarkably different at 0.05 significant level; VMP, vitamins and minerals premix

DISCUSSION

Following are the exchange of views regarding the results on the effect of dietary supplementations of vitamins and minerals premix on milk yield, milk composition and blood profile of dairy cows (Holstein Friesian cross Jersey). In the instant study, there was an increase in milk production with dietary supplementations of vitamins and minerals premix at the rate of 20 g/kg ration regarding to 3% body weight of the animals. The recent results on increase in milk yield are matching with Naik et al. (2014). Who used dietary supplementations of vitamins and minerals premix and as a result there was a huge change (increased) in the milk yield. It is also noted that lactation stage of animals also effect on animal feeding of vitamins and minerals premix, as a result the milk production are changes. Level of vitamins and minerals premix supplementations in diet effect on milk production. Milk yield is increases with high level of vitamins and minerals supplementations, it is because of the involvement of vitamins and minerals in digestion of the nutrients (Shaver and Bal, 2000).

At early and peak lactation usually milk yield increases (Schneider et al., 1988), which can be linked with increased energy intake, good utilization of nutrients by mammary gland and better tissue mobilization (Sklan et al., 1991). Transferring of plasma fatty acids to mammary tissue decreases when the lactation stage goes advance, due to this reason the milk production are high at early and peak lactation as compare to other stages of lactation (late lactation period). However contrary to, Castaneda-Gutierrez et al. (2005), who reported that there is no effect of feeding vitamins and minerals premix to lactating animals, which is completely opposite regarding to the instant study. The reason behind the different result between these studies could be the using of different vitamins and minerals premix for different breeds of cattle. In addition to this environmental stress like high temperature, increase humidity etc. and overcrowding of the animals also has a negative effect on milk yield. Physical status of the animals plays a vital role in the production of milk according to Brown et al. (1962).

There was no direct improvement in the composition of milk due to supplementations of vitamins and minerals premix regarding all level of treatments (10, 15 and 20g/kg ration of feed according to 3% of animal body weight). The current results on milk fat are same with Naik et al. (2014) who also reported that while feeding animals with supplementations of vitamins and minerals premix, the milk fat % does not changes significantly.

However, contrary to milk fat results in the current study, Chouinard et al. (2003) found the effect of feeding vitamins and minerals premix to lactating animals. In milk constituents the fat content is most Perceptive to the dietary changes. However, milk fat % generally decreases by the additions of vitamins and minerals premix because of the increase production of milk (Naik et al., 2014). Milk fat percentage and milk have inverse relation with each other. As in early and peak lactation milk yield increases, the milk fat percentage going decreases and during late lactation the fat percentage is much higher as compare to the early lactation, in the same way the milk yield are going to decline at late lactation Chew (2000).

The proportion of saturated fatty acids (below C16) of milk fat for lactating cows are depress by dietary supplementations of vitamins and minerals, as a result synthesis of de novo fatty acids are reduce in mammary gland and the proportion of saturated fatty acid (C18) are increases due to higher absorption of these acids from blood (Duplessis et al., 2019). The production of total unsaturated fatty acids, long chain fatty acids and medium unsaturated fatty acids are increases during lactation period and total saturated fatty acids in percentage of the total fatty acids of milk decreases. It is because of bypass fat in the diet of dairy cows (Wang et al., 2009).

There is slightly negative effect of vitamins and minerals premix on milk protein percentage but not significant. Milk protein responds more to diet supplemented with vitamins

and minerals premix than sugar (Lactose) and is slightly responsive than fat (Sarwar and Rajput, 1999). Generally, milk protein percentage is reduces by offering diets to animals supplemented with vitamins and minerals premix due to dilution of milk protein, as more volume of milk synthesized is not synchronized with uptake of amino acids by the mammary gland. Moreover the amino acids transport to mammary gland is reduced and due to resistant behavior of insulin, the milk protein synthesis is decreases (Palmquist and Moser, 1981). Low level of protein may decrease lipoprotein synthesis. Due to which the supply of fat and protein to mammary gland is reduced and as a result there is slightly decrease in milk protein percentage. Diet supplemented with Ca-LCFA has effect on milk protein content which is influenced by different stage of lactation of the animals. In both multiparous cows and primiparous cows decline in milk protein content is reported (West and Hill, 1990). Report of no change on milk protein percentage while offering diets supplemented with vitamins and minerals premix according to Naik et al. (2009) and increase according to Wadhwa et al. (2012) are also available.

Milk total solid was significantly different ($P<0.05$) among different treatments. In the current study the ranged of milk total solid is from 10.1 to 11.7 % across different vitamins and minerals premix treatments. While comparing milk total solid among different treatments reported that the percentage of milk total solid was significantly higher at higher level of vitamins and minerals premix and lower at control treatment. There is a positive effect of diets supplemented with vitamins and minerals premix on milk total solid content. In the instant study the increase in milk total solid is same with the work of Moody et al. (1967) and Nawaz and Ali (2016) who also presented same increasing pattern of milk total solids with increasing dietary supplementations of vitamins and minerals premix in their studies. On other side, according to Jacobson et al. (1972) there is no effect of the supplementation of vitamins and minerals premix on milk total solid, by increase feeding of Ca soap to cows. The increase milk total solid also effect on the parity of animals, which is greater for primiparous cows than multiparous cows (West and Hill, 1990).

Solid not fat (SNF) was not significantly different ($P>0.05$) among different treatments. In the current study the ranged of Solid not fat (SNF) is from 7.3 to 8.2 % across different vitamins and minerals premix treatments. While comparing solid not fat (SNF) among different treatments reported that the percentage of solid not fat (SNF) was not significantly higher at higher level of vitamins and minerals premix as compare to control group. There was no tendency in solid not fat (SNF) with increasing dietary supplementation of vitamins and minerals premix. In the instant study the increase in solid not fat (SNF) is same with the work of Boland and Lonergan (2003) who also presented that by increasing of dietary supplementations of vitamins and minerals premix has no effect or even decreasing effect on solid not fat (SNF).

In the instant study, there was no clear difference in blood glucose concentration, because of high and speedy metabolic rate of consumption of glucose and homeostatic process of animal body which does not agree considerable changes in glucose level. Indistinguishable outcome were outlined by Tiwari and Yadava (1994). In the same way according to Son et al. (1996) blood glucose level were not impacted by diets supplemented with vitamins and minerals premix. In early lactation, blood glucose level indicates either energy balance or dietary intake of energy. Although during lactation, the dietary intake of energy of the animal are differ. The level of glucose, free fatty acids and insulin in the blood in mid and late lactation review these changes. When there is variation between the synthesis and utilization of glucose, result is a clinical ketosis but from blood glucose level this is not perfectly predictable earlier to onset according to Lee et al. (1978). There is a switch in liver function from esterification of free fatty acids and proper oxidation to the building of ketone bodies in ketosis. Due to lower voluntary utilization of concentrates and roughages by fatty cows are more predisposed to ketosis as compare to thin cows. It is also known that one third of all clinical ketosis as consequences of other abnormal condition (e.g. metritis, displaced abomasum, acute mastitis) as a result the animals go off feed (Anorexia) and dietary intake of feed are decreases (Iwańska et al., 1999).

At 6 to 8th week of postpartum (late lactation), the reserve present in the body are consumed and as a result milk production decreases to a quantity comparable with the supply of nutrients. After this the respond of blood glucose and insulin are increased relative to grain feeding. There is also increased in lipogenesis and genesis of adipose tissue but at this stage the synthesis of fatty acids is from acetate, not from glucose. The chance of diabetes (excessive glucose in blood) is rare in ruminants therefore the value of blood glucose concentration is predicted to be of little value in determining dietary sufficiency of energy (Zhang et al., 2010). To find out the intake and solubility of the nitrogen containing compounds in diets, the urea nitrogen level of blood will be determine.

For example, feeding dietary urea to animals will much increase the concentration of rumen ammonia and blood urea

that its crude protein equivalent from preformed proteins. Rumen ammonia and blood urea can also increase by insufficient available dietary energy by restricting microbial synthesis of protein. Thus, care must be taken to limit inferences about dietary intake of protein based on urea nitrogen concentration of blood to common protein sources. The blood glucose and blood urea levels were not impacted by diets supplemented with vitamins and minerals premix but increased ($P<0.01$) continuously when the lactation is in advance stage (Mahr-un-nisa and Feroz, 1999).

CONCLUSION

From the present study it was concluded that, Dietary supplementations of vitamins and minerals premix increased milk yield by (14.4 liter/day) remarkably ($P<0.05$) as compared to control group (13.6 liter/day). Dietary supplementations of vitamins and minerals premix didn't improve milk composition: milk fat, milk total solids and solid not fat significantly ($P>0.05$). Dietary supplementation of vitamins minerals premix increased glucose (64.3 to 72.1 mg/dl) and blood urea nitrogen (15.2 to 21.2 mg/dl)

RECOMMENDATIONS

Based on our results, high level of dietary supplementations of vitamins minerals premix in diet (20gm/kg) is recommended for high milk yield. Intermediate level of dietary supplementation of vitamins minerals premix in diet (15gm/kg) is recommended for blood composition of anima. Further study should be carried out to study the effect of dietary supplementations of vitamins minerals premix on growth performance and body weight of calves and cows. Further substantial research is essential to explore the role of dietary supplementations of vitamins minerals premix on reproductive efficiency of cows.

CONFLICTS OF INTEREST

The authors declared no conflict of interest. The funders had no part in the design, collection analyses and interpretation and writing of short communication.

AUTHOR'S CONTRIBUTION

All authors contributed and supported towards writing of this manuscript.

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