



Original Research Article

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## Study on Effect of Vitamin E and Chromium Propionate on Milk Composition of Sahiwal Cattle

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### ABSTRACT

#### Keywords

Chromium propionate, Lactation period, Milk yield, Transition period, Vitamin E

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An experiment was conducted to investigate the effect of vitamin E and Chromium propionate during transition period in Sahiwal cows to assess the possibilities of improvement in production performance of supplementation of vitamin E and Chromium propionate. A total of 28 cows were selected on the basis of their milk yield, parity and body weight are grouped into four homogenous treatment groups of 7 each. No significant effect of supplementation was seen on milk composition. Whereas, numerically higher was observed of lactose, SNF and total solid percent in milk in supplemented group compared to control group. The present study provided evidence of beneficial effect of Vitamin E and Chromium propionate on milk composition of Sahiwal cattle in transition period.

### Introduction

Dairy is an important and progressive sector of India's national economy and plays a crucial role in the socio economic development. Livestock Sector not only provides essential proteins and nutritious human diet through milk, eggs, meat etc however conjointly plays an important role in utilization of non-edible agricultural by-products and provides raw material by-products such as hides, skin, blood, bone, fat etc. Sahiwal is one of the best dairy breeds in

India and Pakistan. It originated from the Sahiwal district of Punjab province in Pakistan. It is tick-resistant, heat-tolerant and noted for its high resistance to parasites, both internal and external. The trace minerals closely involved in the maintenance of normal growth and development, reproduction and health of animals. Deficiency of which may affect productivity, particularly reproduction and health. Provision of adequate mineral and vitamin nutrition during the transition period may be used as a strategy to not only enhance the cow's immunity against disease (Dang *et*

*al.*, 2013) but also maintain milk quality and production (Cortinhas *et al.*, 2010). Nikkhah *et al.*, (2010) observed that milk protein percentage increased significantly ( $p < 0.01$ ) at Cr supplementation. Whereas, milk fat percentage tended to increase significantly ( $p < 0.10$ ) and lactose percentage increased significantly ( $p < 0.05$ ) when Cr was supplied at  $0.05 \text{ mg/kg BW}^{0.75}$ . Rikhari (2008) reported that increasing trend in milk yield and milk composition (fat%, total solid) was recorded due to increasing level of supplementation of chromium in the ration of productive crossbred cows. However there was no significant effect of chromium supplementation on milk composition viz. SNF, Protein and lactose. Gautam (2015) estimated in different experimental groups to evaluate the effect of chromium supplementation from various sources on milk production and milk composition in lactating Murrah buffaloes. He found that milk production increase significantly but fortnightly milk composition (fat, protein, lactose, SNF and TS) were statistically similar in all the producing Murrah buffaloes.

## Materials and Methods

An experiment was conducted to investigate the effect of vitamin E and Chromium propionate during transition period in Sahiwal cows. A total of 28 cows were selected on the basis of their milk yield, parity and body weight are grouped into four homogenous treatment groups of 7 each. Out of these, one group served as control fed as per NRC (2001) wherein no supplementation was given. Cows in treatment groups, Group-1 vitamin E, Group-2 Chromium propionate and Group-3, vitamin E + Chromium propionate supplementation were given daily along with control diet. The USP (United States Pharmacopoeia) defines 1 IU of vitamin E as equal to 1mg of  $\alpha$ -tocopheryl acetate (NRC 2001) thus, to supplement 2000 IU of vitamin

E, 2000mg (equivalent to 2 g) of  $\alpha$ -tocopheryl acetate and Chromium propionate (0.5 mg per kg of DM) was offered. For milk yield samples were collected at fortnightly and for fat percent milk sample were collected at @ day 7<sup>th</sup>, 15<sup>th</sup>, 30<sup>th</sup>, 45<sup>th</sup> and 60<sup>th</sup> day post partum. Milking was done twice a daily and milk yield records were maintained throughout the experimental period. Fat percent was estimated by automatic milk analyzer.

## Results and Discussion

### Milk protein percentage

Milk protein percentage of control and supplemented cows during the early lactation period has been presented in Table 1(a). Protein percentage of milk differed non-significantly between groups and different days of lactation period. The interaction effect including group x days was found non-significant. Analysis of variance of milk protein percentage in control and supplemented cows up to 60 days of lactation is presented in Table 1 (b). The highest value of overall mean  $\pm$  SE of milk protein percentage was recorded in control group followed by Vitamin E, Chromium propionate and combination supplemented cows. The overall mean values of milk protein percentage of supplemented cows were numerically higher among all groups as compared to the control group.

Similar findings were reported by Sarma (2013) and Saiady *et al.*, (2004) and contrary results were reported by Mutoni *et al.*, (2012) and Uchida *et al.*, (2001).

### Milk lactose percentage

Milk lactose percentage of control and supplemented cows during the early lactation period has been presented in Table 2(a).

Lactose percentage of milk differed non-significantly between groups and different days of lactation period. The interaction effect including group x days was also found non-significant. Analysis of variance of milk protein percentage in control and supplemented cows up to 60 days of lactation is presented in Table 2(b).

The overall Mean±SE values of milk lactose

percentage of supplemented cows were numerically higher than other supplemented groups, although the difference between the control and other supplemented was found non-significant.

Our results are resembles with Sarma (2013) and Qiang *et al.*, (2009), whereas, contrary results were reported by Mutoni *et al.*, (2012) and Nikkhah *et al.*, (2010).

**Table.1(a)** Mean (±SE) of milk Protein (%) in control and supplemented cows

Groups	Days of lactation					Overall mean
	7	15	30	45	60	
Control	3.71±0.22	3.55±0.19	3.87±0.31	3.29±0.04	3.25±0.04	<b>3.54±0.09</b>
Supplemented Vitamin E	3.61±0.17	3.45±0.27	3.74±0.26	3.40±0.04	3.34±0.03	<b>3.51±0.08</b>
Supplemented Chromium propionate	3.48±0.20	3.54±0.36	3.61±0.47	3.42±0.04	3.33±0.05	<b>3.48±0.12</b>
Supplemented combination	3.49±0.12	3.44±0.25	3.39±0.36	3.45±0.04	3.49±0.04	<b>3.45±0.02</b>
Overall mean± SE	<b>3.57±0.10</b>	<b>3.50±0.14</b>	<b>3.65±0.15</b>	<b>3.39±0.02</b>	<b>3.35±0.02</b>	<b>3.49±0.05</b>

**Table.1(b)** Analysis of variance of milk protein percentage in control and supplemented cows

Source of variation	DF	SS	Mean Sum of squares	F Ratio
Groups	3	0.13	0.04	0.13
Days	4	1.72	0.43	1.32
Groups x Day	12	1.37	0.11	0.35
Residual	120	39.42	0.32	

**Table.2(a)** Mean (±SE) of milk Lactose (%) in control and supplemented cows

Groups	Days of lactation					Overall Mean
	7	15	30	45	60	
Control	4.25±0.05	4.48±0.16	4.45±0.16	4.58±0.15	4.52±0.16	<b>4.45±0.06</b>
Supplemented Vitamin E	4.43±0.17	4.63±0.12	4.44±0.15	4.54±0.13	4.48±0.14	<b>4.50±0.06</b>
Supplemented Cr	4.56±0.16	4.45±0.14	4.53±0.13	4.53±0.14	4.60±0.13	<b>4.53±0.06</b>
Supplemented combination	4.54±0.13	4.58±0.13	4.54±0.14	4.39±0.15	4.42±0.15	<b>4.49±0.06</b>
Overall Mean± SE	<b>4.44±0.07</b>	<b>4.53±0.07</b>	<b>4.49±0.07</b>	<b>4.51±0.07</b>	<b>4.50±0.07</b>	<b>4.50±0.03</b>

**Table.2(b)** Analysis of variance of milk lactose percentage in control and supplemented cows

Source of Variation	DF	SS	Mean Sum of squares	F Ratio
Groups	3	0.11	0.04	0.27
Days	4	0.12	0.03	0.22
Groups x Days	12	0.78	0.06	0.46
Residual	120	16.85	0.14	

**Table.3(a)** Mean ( $\pm$ SE) of SNF (%) in control and supplemented cows

Groups	Days of lactation					Overall Mean
	7	15	30	45	60	
Control	9.12 $\pm$ 0.21	9.21 $\pm$ 0.46	8.67 $\pm$ 0.24	8.25 $\pm$ 0.24	8.49 $\pm$ 0.32	<b>8.75<math>\pm</math>0.14</b>
Supplemented Vitamin E	9.38 $\pm$ 0.21	8.73 $\pm$ 0.17	8.75 $\pm$ 0.41	8.61 $\pm$ 0.24	8.49 $\pm$ 0.37	<b>8.79<math>\pm</math>0.13</b>
Supplemented Cr	9.22 $\pm$ 0.35	9.12 $\pm$ 0.35	8.45 $\pm$ 0.36	8.62 $\pm$ 0.43	8.84 $\pm$ 0.49	<b>8.85<math>\pm</math>0.18</b>
Supplemented combination	9.02 $\pm$ 0.50	9.01 $\pm$ 0.50	8.96 $\pm$ 0.47	8.87 $\pm$ 0.53	8.60 $\pm$ 0.52	<b>8.89<math>\pm</math>0.21</b>
Overall mean $\pm$ SE	<b>9.18<math>\pm</math>0.16</b>	<b>9.02<math>\pm</math>0.19</b>	<b>8.71<math>\pm</math>0.18</b>	<b>8.59<math>\pm</math>0.18</b>	<b>8.61<math>\pm</math>0.21</b>	<b>8.82<math>\pm</math>0.08</b>

**Table.3(b)** Analysis of variance of SNF in control and supplemented cows

Source of variation	DF	SS	Mean Sum of squares	F Ratio
Groups	3	0.420	0.135	0.135
Days	4	7.95	1.987	1.912
Groups x Days	12	3.81	0.318	0.306
Residual	120	124.72	1.04	

**Table.4(a)** Mean ( $\pm$ SE) of Total solid in control and supplemented cow

Groups	Days of lactation					Overall Mean
	7	15	30	45	60	
Control	13.16 $\pm$ 0.22	13.07 $\pm$ 0.46	12.49 $\pm$ 0.25	12.03 $\pm$ 0.34	12.11 $\pm$ 0.33	<b>12.57<math>\pm</math>0.16</b>
Supplemented Vitamin E	13.66 $\pm$ 0.20	12.83 $\pm$ 0.18	12.82 $\pm$ 0.42	12.60 $\pm$ 0.28	12.27 $\pm$ 0.40	<b>12.84<math>\pm</math>0.15</b>
Supplemented Cr	13.31 $\pm$ 0.39	13.14 $\pm$ 0.34	12.36 $\pm$ 0.35	12.52 $\pm$ 0.53	12.59 $\pm$ 0.51	<b>12.78<math>\pm</math>0.19</b>
Supplemented combination	13.59 $\pm$ 0.50	13.35 $\pm$ 0.49	13.22 $\pm$ 0.47	12.71 $\pm$ 0.69	12.65 $\pm$ 0.51	<b>13.10<math>\pm</math>0.23</b>
Overall Mean $\pm$ SE	<b>13.43<sup>b</sup><math>\pm</math>0.17</b>	<b>13.10<sup>ab</sup><math>\pm</math>0.19</b>	<b>12.72<sup>ab</sup><math>\pm</math>0.19</b>	<b>12.47<sup>a</sup><math>\pm</math>0.24</b>	<b>12.41<sup>a</sup><math>\pm</math>0.21</b>	<b>12.82<math>\pm</math>0.09</b>

Note – Means bearing different superscripts differ significantly.

**Table.4(b)** Analysis of variance of total solid in control and supplemented cows

Source of variation	DF	SS	Mean Sum of square s	F Ratio
Groups	3	5.018	1.673	1.395
Days	4	21.166	5.292	4.415**
Groups x Days	12	3.510	0.293	0.24
Residual	120	143.83	1.199	

Asterisks indicate level of significance (\*\*P<0.01)

### Milk SNF percentage

Milk SNF percentage of control and supplemented cows during the early lactation period has been presented in Table 3(a). SNF percentage of milk differed non-significantly between groups and different days of lactation period. The interaction effect including group x days was found non-significant. Analysis of variance of milk SNF percentage in control and supplemented cows up to 60 days of lactation is presented in Table 3(b).

The overall Mean $\pm$ SE values of milk SNF percentage of supplemented cows were numerically higher among all groups as compared to the control group. The difference between the control and other supplemented was non-significant. Similar results were reported by Sarma (2013); Qiang *et al.*, (2009) and Uchida *et al.*, (2001).

### Total solid percentage

Total solid percentage of milk in control and supplemented cows during the early lactation period has been presented in Table 4(a). Total solid percentage of milk differed non-significantly between groups but Total solid percentage was found highly significant (P<0.01) between different days of lactation period. The interaction effect including group x days was found non-significant. Analysis of variance of milk SNF percentage in control and supplemented cows up to 60 days of lactation is presented in Table 4(b).

The overall mean values of milk total solid percentage of supplemented cows were numerically higher among all supplemented groups as compared to the control group.

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