The Pharma Innovation Journal 2022; SP-11(12): 260-263

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(12): 260-263

www.thepharmajournal.com
Received: 07-10-2022
Accepted: 15-11-2022

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Response of concentrate mixture and major and micro nutrients on improved growth performance of lactating cows

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Abstract
The objective of the study was to describe daily body weight gain changes during lactation in daily cows. And to Correlate body weight loss with production and reproductive performance. Closely analysis of the body weight data shown that as much and probably more of the variation in milk production was associated with body weight as also with age studies showed improvement in fertility of dairy cows should be achieved by minimizing body weight loss in early stage of lactation.

Keywords: Fertility, lactation, body weight

Introduction
Good breeds of cattle are mostly confined to comparatively dry areas such as Haryana, Punjab, Rajasthan, Gujarat and Madhya Pradesh. India possesses 27 acknowledged indigenous breeds of cattle and seven breeds of buffaloes. These well-defined breeds are found in the dry parts of the country. Other types of breed are non-descript and do not belong to any defined breed. The Indian breeds of cattle are categorized into the following types: milch breeds yield a large quantity of milk, while the bullocks are not of high quality, e.g., Gir, Red Sindhi, Sahiwal, Tharparkar and Deoni. Mineral requirement of animals depend on many factors including age, stage of growth, lactation stage and the balance with other nutrients, with some breeds within species showing particular adaptation to local mineral availability (Khan *et al*. 2007) [4]. In addition to the importance of energy in livestock diets, it is known that adequate amounts of essential minerals are critical to maximizing the productivity and health of livestock (Underwood & Suttle, 1999) [14]. Numerous studies have shown that mineral deficiencies can lead to impaired growth and reproduction & increase in disease, due to impaired immune function, and serious deficiencies may even cause death (Mc Dowell 1997; Underwood & Suttle 1999) [7, 14]. In developing countries, mineral disorders have been shown to be a greater cause of losses than infection diseases (Mc Dowell, 1985; Judson and Mc Forlane, 1998) [6, 3]. The diets of cattle, buffalo and goat were deficient in calcium and phosphorus and adequate in Mg, Mn, Cu, Zn. and Fe content during lactation and pregnancy stages under present feeding regime. These animals require supplementation in this based diet (Shukla et.al. 2007) [12].
The major functions which these essential minerals serve could be divided into 4 main types:-

a) Structural
b) Physiological
c) Catalytic
d) Regulatory

The concentration of essential minerals in various cells & tissues of animals must be maintained within a narrow range for proper growth, health and production of the animals. Determination of minerals status of soils, feed and animals on agro climatic zone/area basic is needed as such as information is lacking for majority of zones. This would help in the preparation of area specific minerals supplements so that the livestock owner may be benefited through increased productivity of their animals.

Keeping in view the above facts, the present study was taken up with the following objectives:

1. To study the feeding regime of on farm trial of dairy cows.
2. Analysis of body weight of milking cows for different dairy managemental practices.

Review of Literature

Body Weight

Sajpaul *et al.* (1999) [9] conducted experiment to investigate growth and reproductive efficiency of crossbred heifers. Twenty five crossbred (Holstein Fresien X Sahiwal) heifers (16-18 months, 225-23 kg b.wt.) were randomly distributed into five groups and fed on plain wheat straw (PWS) as T_1, 1.5% urea sprayed PWS (T_2), 1.5% urea plus 0.2% sodium sulphate added to urea solution before spraying PWS (T_3), PWS fermented with 3.5% urea at 40% moisture for 9 days (T_4) and PWS treated as T_4 with additional 0.2% sodium sulphate in urea solution (T_5). In addition, 5 kg green and sufficient concentrate was supplied for intended growth rate of 600 gm/day. The daily weight gain in the control group (T_1) (454 gm) was significantly ($P < 0.05$) lower than in fermented straw groups T_2, T_3 and T_4 (493 gm, 492 gm and 510 gm, respectively) remained similar. The DMI and CPI per kg body weight gain though higher in control group (T_1) was non-significantly variable among other groups. The heifers in control (T_1) and urea sprayed (T_2) groups came into heat at a significantly ($P < 0.05$) lower age than fermented wheat straw (T_4). Body weight at first heat of heifers in group T_2 was lower than in group T_5. The age and body weight at first service differed non-significantly ($P < 0.05$) in all the groups. The similar growth, feed and reproductive efficiency in simple urea sprayed group (T_2) V/S fermented wheat straw group (T_4) suggested more practicability of the former due to lesser cost of urea and labour.

Material and Methods

The materials used for conducting the research and various methodologies used for the completion of research work are described

Location and place of work

The reseach work was conducted on lactating cows at villages of district Sagar, Madhya Pradesh.

Selection of the Animals and Experimental Design

For the present study, 40 lactating Tharparkar cows of the II nd to III rd lactation were selected and divided randomly into 4 dietary treatments of 10 animals each considering their body weight, milk yield, parity and stage of lactation. The experiment was conducted for the period of 180 days.

Body weight

Body measurements of all the forty cows were taken in the beginning and at the end of the experiment. The weight of animals was taken before feeding and watering in the morning by the Shaffer's formulae:

$$\text{Live weight (in pounds)} = \frac{\text{length x (Girth)}^2}{300}$$

Selection of animals –

All the selected cows showed poor body condition. Anoestrous was the major problem as 91.66% of the selected cows had not shown estrous for the last over 6 months. The health condition of the selected cows suggested that the malnutrition might have been the cause of anestrous.

Feeding schedule-

The concentrate mixture was offered at 3.30am. and 3.00pm whereas the chaffed mixed roughage was offered at 3.00am. The water was provided to each animal twice a day.

Dietary Treatment

The four dietary treatment used are as under –

Group I (T_1)

The animals of this group were be maintained on strategic supplementation. The diet will be given exactly as per their nutrient requirement.

Group II (T_2)

The animals of this group were be fed similar to diet as group 2 with addition of mineral supplementation.

Statistical analysis

The data obtained were analyzed using general statistics *viz*., computation of percentage, mean, standard deviation and correlation coefficient. Two sample test for mean and proportion on normal distribution and one way ANOVA was used to find significant differences among groups.

Result and Discussion

Body weight of the animals

The body weight of all the animals was recorded before and after the experiment to observe the effect of strategic supplementation on change in their body weight. The average body weight of cows in group I at the start of the experiment was 355.18±5.79 kg while, after the termination, it was recorded as 358.74±6.04 kg. The average body weight recorded in group II was 367.43±5.39 kg before the experiment, while at the end of the experiment it was 370.86± 5.56. kg. In group III, the average body weight of the animals before the start of experiment was 369.43 ±4.21 kg while, that at the end of experiment was 362±4.58 kg. In the last group i.e. group IV the average body weight of the animals before the start of experiment was 365.90±5.24kg that at the end of the experiment was 369.35±5.04kg. The range of the body weight of group I animals before experiment were 334.9 to 385.2 kg and after the experiment were 338.8 to 390.3 kg. The range of the body weight recorded in group II animal before experiment were 332.9 to 389.0 and after the experiment were 334.7 to 389.5 kg. In group III, the range of the body weight before the start of experiment were 352.9 to 389.0 kg while, that at the end of experiment were 350.2 to 383.7 kg. In the last group i.e. group IV the range of the body weight before the start of the experiment were 339.3 to 397.2 kg while, that at the end of the experiment were 342.1 to 399.6 kg.

Studies revealed that there was no significant effect of strategic supplementation on the body weight of animals. Individual and group wise averages of initial body weight of cows are presented in Table 9.

Gain and loss in the body weight of the animals was calculated after recording the initial and final body weight of the animals which is presented in the text. In group I, the gain in the body weight of the animals was 3.84 kg. The average gain in the body weight of the animals of group II was 3.42 kg. But in group III, there was loss in the body weight of animals and the average loss in the body weight of animals of this group was 2.97 kg. In group IV, the gain in the body weight of the animals was 3.45 kg. The gain or loss in the body weight of animals of all the group along with their group average is presented in Table.

Table 1: Individual as well as mean body weight of animals before the start of experiment

Group I		Group II	
Animal No.	**Body Weight (Kg)**	**Animal No.**	**Body Weight (Kg)**
C1	352.9	D1	381.7
C2	388.1	D2	372.4
C3	352.9	D3	339.3
C4	371.3	D4	365.5
C5	363.7	D5	372.2
C6	355.5	D6	349.5
C7	369.5	D7	368.3
C8	377.7	D8	397.2
C9	373.7	D9	357.5
C10	389.0	D10	355.4
-	369.43	-	365.90
-	4.21	-	5.24
-	13.31	-	16.58

Table 2: Individual as well as mean body weight of animals after the termination of experiment

Group I		Group II	
Animal No.	**Body Weight (Kg)**	**Animal No.**	**Body Weight(Kg)**
C1	350.6	D1	384.8
C2	381.3	D2	374.1
C3	350.2	D3	342.1
C4	367.9	D4	370.1
C5	352.9	D5	374.1
C6	354.3	D6	354.6
C7	379.5	D7	370.5
C8	380.3	D8	399.6
C9	369.3	D9	363.9
C10	383.7	D10	359.2
-	367.00	-	369.30
-	4.39	-	5.05
-	13.88	-	15.96

Table 3: Change in Body Weight (gain/ loss) of animals during experimental period

Group I		Group II	
Animal No.	**Body Weight (Kg)**	**Animal No.**	**Body Weight (Kg)**
C1	−2.30	D1	3.10
C2	−6.80	D2	1.70
C3	−2.70	D3	2.80
C4	−3.40	D4	4.60
C5	−10.80	D5	1.90
C6	−1.20	D6	5.10
C7	5.80	D7	2.20
C8	2.60	D8	2.40
C9	−4.40	D9	6.40
C10	−5.30	D10	3.80
-	−2.85	-	3.40

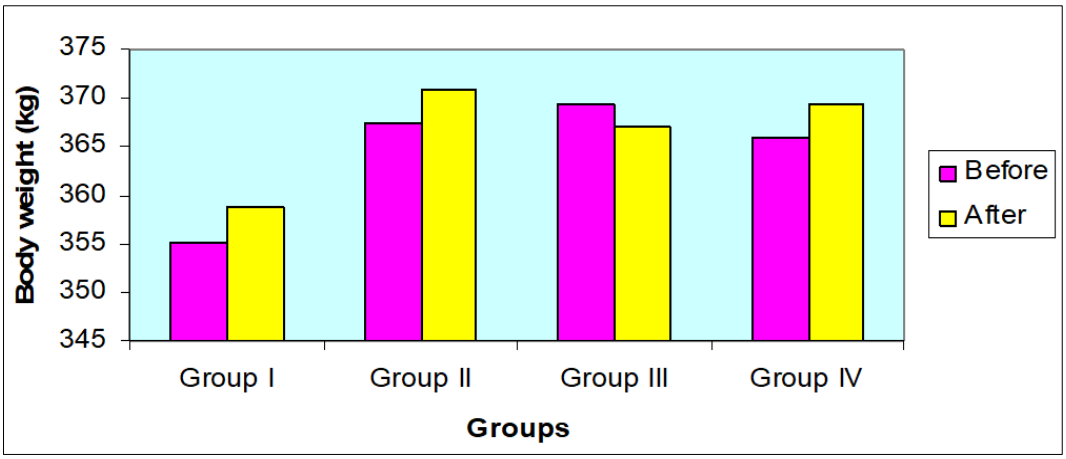

Fig 1: Body weight of animals before and after termination of experiment

Discussion

Effect on body weight

In the present study average change in body weight in animals of group III and IV respectively during the entire period of 180 days was -2.97 and 3.45.

Body weight among cows from different groups did not differ significantly variation per day body weight was only in grams. As the weight was measured using formulae this variation can not be accounted for any dietary effect. Further, in such large animals such small variation in body weight is meaning less. However, supplementation of mineral mixture to conventional feeding method in the dairy led to increase in the weight gain. But because of strategic supplementation there was reduction in the weight gain. That is true also because strategic supplementation was aimed with the supply of nutrients as per the total requirement of animals and no excess feeding was done. This feeding was probably not sufficient to meet out the excess energy requirement to maintain the excess fat deposited in the body of cows as a result there would have been mobilization of excess fat of the body resulting in reduction in their body weight.

Whereas Spears and Kegley (2002) [13], Hatfield *et al*. (2001), Jadhav *et al*. (2008) [2], Dhuria *et al*. (2007) [1], Mane *et al*. (2004) [5], Samantha *et al*. (2004) [10], Sharma *et al*. (2006) [11], Mayland *et al*. (1980) [8] showed an increase in the body weight of cattle when supplemented with minerals, an improvement in their growth rate has been observed.

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