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Effect of different feed combination on growth performance of Deoni heifer calves

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Abstract
The experiment was conducted on effect of different feed combination on growth performance of Deoni heifer calves. The research was conducted by Randomized block design with four treatments: T_1- Dry fodder (jowar Kadbi) + Green fodder (jowar multicut) + concentrate mixture-I, T_2 -Dry fodder (jowar Kadbi) + Green fodder (jowar multicut) + concentrate mixture-II, T_3 -Dry fodder (jowar Kadbi) + Green fodder (jowar multicut) + concentrate mixture-III, T_4 -Dry fodder (jowar Kadbi) + Green fodder (jowar multicut) + concentrate mixture-IV. The all Deoni calves exhibited satisfactory growth rate and difference were significant. The per Kg body weight was higher in T_2 treatment. Body measurement (chest girth, length, height, belly girth) was also higher in T_2 treatment. The treatment T_2 demonstrated a better and desirable result than the treatments T_1, T_3 and T_4.

Keywords: Deoni heifers, concentrate mixture, growth performance, body weight

Introduction
About 20.5 million people depend upon livestock for their livelihood as Livestock contributed 16% to the income of small farm household. Livestock provides livelihood to two-third of rural community. It also provides employment to about 8.8% of the population in India. Livestock sector contributes 4.11% GDP and 25.6% of total Agriculture GDP. (Anonymous, 2018) [4] According to 20th livestock census (2019) India is world's highest livestock population at about 535.78 million. India has 192.49 million cattle, 109.85 million Buffalo, Goats 148.88 million and Sheep 74.26 million populations. India has second largest poultry market in the world and also second largest producer of fish in world. Register breed of Cattle; 41, Buffalo; 13, Goat; 28, Sheep; 42 founds in India. (20th Livestock Census 2019)
In livestock production the major problem is the unavailability of quality feed and its high cost; resulting in reduced profitability and low productivity through adversely affecting health, production and reproduction. (Jabber *et al.*, 2006) [12]. For marginal farmer, affording good quality concentrate is becoming more and more difficult due to high cost. Heifers are mostly fed on cereals straw, poor quality fodder. Since decades, search for cheaper source of alternate nutritious feeds for livestock particularly for dairy animals is going on. (Roy *et al.*, 2015) [9].

Materials and Methods
The experiment was conducted at Cattle Cross Breeding Project, Department of Animal Husbandry and Dairy Science, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. 24 calves were selected for the experiment. The selected experimental calves were divided into 4 groups (six calves in each group). The experiment was conducted from 26 Jan 2022 to 26 April 2022 at Cattle Cross Breeding Project. The experimental period was 90 days and 15 days pre-experimental period. Ingredient used in T_1 treatment- Sugras, T_2 – maize+ Cotton seed cake + soyabean + Tur + Mineral mixture + salt, T_3 – Sorghum + Cotton seed cake + soyabean + Tur+ Mineral mixture + salt, T_4 – Wheat+ Cotton seed cake + soyabean + Tur + Mineral mixture + salt. In treatment T_1, T_2, T_3 and T_4 the average body weight of the calves were 118.5, 121.66, 120.5 and 119 Kg, respectively. The observation recorded during the research was Body weight gain, body height, body length, chest girth, belly girth. The data was statistically analyzed by Randomized Block Design for testing differences between body weight and body measurements as per procedure recommended by Amble 1975.

Results

1. Body weight gain

Table 1 has shown average weight gain (Kg) of calves. It is observed that the initial body weight of T_1, T_2, T_3 and T_4 were 118.5, 121.66, 120.5, and 119 kg, respectively. Final body weight of calves under treatments T_1, T_2, T_3 and T_4 were recorded 150, 156.33, 147.33, 148.50 kg, respectively. Total body weight gain was calculated from difference between initial and final body weight of calves. Total body weight gain of T_1, T_2, T_3 and T_4 were 31.50, 34.67, 26.83 and 29.5 respectively. Daily body weight gain of T_1, T_2, T_3 and T_4 were 0.350, 0.385, 0.298 and 0.327, respectively.

Table 1: Effect of different feeding treatment on body weight gain (Kg)

Treatments	Average Initial weight (Kg)	Average final weight (Kg)	Period weight gain (Kg)	Weight gain Kg/week/calves	Weight gain Kg/day/calves
T_1	118.5	150.00^b	31.50^b	2.40^b	0.350^b
T_2	121.66	156.33^a	34.67^a	2.66^a	0.385^a
T_3	120.5	147.33^d	26.83^d	2.06^d	0.298^d
T_4	119	148.50^c	29.50^c	2.23^c	0.327^c
SE	1.41	1.13	1.30	0.09	0.02
CD (0.05)	NS	3.482	3.79	0.28	0.057

2. Body length

Table 2 show average body length (cm) of calves. In first week of experiment was 84.40, 84.60, 84.20 and 85.60 of T_1, T_2, T_3 and T_4 respectively. The data from the Table 2 displays increasing body length of calves during the experimental period in all treatments. Initially there was no significant difference up to fifth week but from sixth to thirteenth week treatments differ significantly. The body length of T_1, T_2, T_3 and T_4 at sixth week were 88.15, 88.30, 86.45 and 88.60 cm, respectively. At thirteenth week the body length of T_1, T_2, T_3 and T_4 were 94.40, 96.40, 90.20, 93.00 cm, respectively. Treatment T_2 shows significantly higher values followed by T_3, T_4 and T_1.

Table 2: Effect of feeding different treatment on body length (cm)

Week	T_1	T_2	T_3	T_4	SE	CD (0.05)
1	84.40	84.60	84.20	85.60	2.09	NS
2	85.5	85.60	84.20	86.10	2.21	NS
3	85.9	86.10	84.95	86.85	1.48	NS
4	86.9	86.60	85.95	87.60	1.24	NS
5	87.65	87.60	85.95	88.60	1.10	NS
6	88.15^b	88.30^{ab}	86.45^c	88.60^a	1.78	5.351
7	89.4^a	89.30^{ab}	87.45^c	89.10^b	1.44	4.339
8	89.90^{ab}	90.50^a	87.45^c	89.10^b	1.32	3.980
9	90.65^b	92.0^a	87.95^c	90.30^{bc}	1.04	3.136
10	91.65^{ab}	93.0^a	87.95^c	90.80^b	1.67	5.033
11	92.15^b	94.20^a	88.7^c	91.80^{bc}	1.18	3.544
12	93.15^b	95.40^a	89.50^c	92.30^{bc}	1.60	4.831
13	94.40^{ab}	96.40^a	90.20^c	93.00^c	1.01	3.07

Note: The mean value with different superscript in the same row differed significantly ($P<0.05$)

3. Chest girth

The data given in table 3 shown chest girth (cm) of calves in first week of experiment was 121.40, 123.20, 122.20 and 120.40 of T_1, T_2, T_3 and T_4 respectively. During the experimental period in all treatments there is increasing chest girth is illustrated in the Table 3 Initially there was no significant difference up to fifth week but from sixth to thirteenth week treatments differ significantly. The chest girth of T_1, T_2, T_3 and T_4 at sixth week were 126.5, 128.4, 126.1 and 124.9 cm, respectively. At thirteenth week the chest girth of T_1, T_2, T_3 and T_4 were 133.80, 136.40, 130.40, 132.0 cm, respectively. Treatment T_2 shows significantly higher values followed by T_3, T_4 and T_1. Calves raised on various diets performed well, gradually growing in height, length, and chest girth. Differences in the various combinations of feed, however, were more or less similar, which may be because all of the treatments used the same equipment, leading to comprehensive treatment.

Table 3: Effect of feeding different treatment on chest girth (cm)

Weeks	T_1	T_2	T_3	T_4	SE	CD (0.05)
1	121.40	123.20	122.20	120.40	2.26	NS
2	122.4	124.2	122.9	121.4	2.12	NS
3	123.15	125.45	123.9	122.15	1.23	NS
4	124.35	126.2	124.4	123	2.14	NS
5	125.35	127.2	125.1	124.15	1.75	NS
6	126.5^b	128.4^a	126.1^b	124.9^c	1.23	3.802
7	127.75^{ab}	129.9^a	126.6^b	126.1^b	1.13	3.482
8	128.75^{ab}	131.15^a	127.1^b	126.85^c	1.91	5.912
9	129.5^b	132.15^a	127.85^c	128^c	1.60	4.953
10	130.65^b	133.15^a	128.6^c	129^c	1.10	3.314

11	131.65 b	134.4 a	129.1 c	129. c 75	1.22	3.670
12	132.8 b	135.5 a	129.85 c	131 c	0.94	1.332
13	133.80 b	136.40 a	130.40d	132.0 c	0.43	1.291

4. Body height

The data indicated in Table 4 shown body height (cm) of calves in first week of experiment was 103.60, 104.40, 102.60 and 100.20 of T_1, T_2, T_3 and T_4 respectively. The data of Table 4 is showing that the body height of calves during the whole experimental period of all treatments is increasing gradually. Initially up to fifth treatment there was no significant difference but from fifth to thirteenth week there is significant difference in all the treatments. The body height of T_1, T_2, T_3 and T_4 at sixth week were 109.35, 110.2, 107.35 and 105.9 cm respectively. The body height of T_1, T_2, T_3 and T_4 at thirteenth week was 117, 118.60, 113.20 and 112.8 cm respectively.

Table 4: Effect of different feeding treatment on body height (cm)

Week	T_1	T_2	T_3	T_4	SE	CD (0.05)
1	103.60	104.40	102.60	100.20	2.22	NS
2	104.6	105.60	103.35	101.2	3.09	NS
3	105.35	106.6	103.85	101.95	2.29	NS
4	106.6	107.8	104.85	103.45	3.23	NS
5	107.85	109.3	106.1	104.65	2.34	NS
6	109.35^{ab}	110.2^{a}	107.35^{b}	105.9^{c}	1.17	5.462
7	109.85 ^{b}	111.4 ^{a}	108.1^{c}	106.65^{d}	1.52	4.691
8	111.05 ^{ab}	112.65 ^{a}	109.1^{b}	107.65^{c}	1.12	3.391
9	112.3^{b}	114.15 ^{a}	110.1^{c}	108.15^{d}	0.49	1.471
10	113.3 ^{ab}	115.4 ^{a}	110.85^{b}	109.35^{b}	1.67	5.164
11	114.55^{ab}	116.15 ^{a}	112^{b}	110.35^{c}	1.60	4.832
12	115.8 ^{b}	117.4 ^{a}	112.5^{c}	111.55^{c}	1.57	4.735
13	117.00 ^{ab}	118.60 ^{a}	113.20^{b}	112.8^{c}	0.46	1.440

5. Belly girth

The data given in table 5 shown belly girth (cm) of calves in first week of experiment was 140.16, 143.08, 141.02 and 141.12 of T_1, T_2, T_3 and T_4 respectively. During the experimental period in all treatments there is increasing belly girth is illustrated in the Table 5 Initially there was no significant difference up to fifth week but from sixth to thirteenth week treatments differ significantly. The belly girth of T_1, T_2, T_3 and T_4 at sixth week were 148.06, 149.21, 145.59 and 146.17 cm, respectively. At thirteenth week the belly girth of T_1, T_2, T_3 and T_4 were 154.29, 158.59, 149.16 and 152.23 cm, respectively. Treatment T_2 shows significantly higher values followed by T_3, T_4 and T_1.

Table 5: Effect of feeding different treatment on Belly girth (cm)

Week	T1	T2	T3	T4	SE(M)	CD at 5%
1	140.16	143.08	141.02	141.12	2.17	NS
2	141.36	144.28	141.77	142.12	2.33	NS
3	142.36	145.51	142.89	142.87	1.49	NS
4	143.56	146.51	143.59	143.62	1.31	NS
5	145.56	147.71	144.59	145.62	1.61	NS
6	148.06^{ab}	149.21^{a}	145.59^{c}	146.17^{b}	1.72	5.332
7	149.29^{ab}	150.96^{a}	145.79^{c}	147.37^{b}	1.67	5.164
8	150.29^{b}	152.96 ^{a}	146.29^{d}	148.07^{c}	1.50	4.646
9	151.29^{b}	154.16 ^{a}	147.04^{c}	149.28^{bc}	1.91	5.917
10	152.29^{b}	155.16 ^{a}	147.59^{d}	150.03^{c}	1.23	3.802
11	152.79^{b}	156.66 ^{a}	148.66^{c}	151.03^{bc}	1.64	5.059
12	153.79^{b}	157.91 ^{a}	149.16^{c}	152.23^{b}	1.56	4.816
13	154.29^{b}	158.59 ^{a}	150.51^{d}	153.23^{c}	1.01	3.123

Discussion

Body weight gain has similar observations by Adangale (2009) [1], Jamara *et al.* (2014) [8], and Anjum *et al.* (2014) [3]. In body length the current observations are consistent with the observation made by earlier researchers Jabbar *et al.* (2012) [6] and Jadhav *et al.* (2011) [7]. The current observations of chest girth resemble to those made by earlier researchers Zanton and Heinrichs (2005) [11], Shelke *et al*. (2011) [7, 10]. The results of body height are more in line with those made by previous researchers. Jabbar *et al*. (2012) [6]. The current observation of belly grith the current observation are similar to the Das (2016) [5], he reported that morphological characteristics of Red Kandhari cattle in breeding tract.

Conclusion

The concentrate-II (T_2) feeding regimen is adequate to satisfy the calves appetites and nutritional needs. It was found that feeding concentrate-II (T_2), along with dry and green fodder, resulted in the highest growth rate (weight gain). Body measurements (chest girth, body length, height, belly girth) of Deoni calves under the treatments T_2 proved to be statistically significant effect.

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