RESEARCH PAPER
Research Journal of Animal Husbandry and Dairy Science
Volume 8 | Issue 2 | December, 2017 | 113-118
e ISSN-2231-6442
DOI: 10.15740/HAS/RJAHDS/8.2/113-118
Visit us: *www.researchjournal.co.in*

Comparative studies on growth performance of indigenous calves fed with different concentrate mixture

RAJAN MISHRA, S.P. NAGE, R. R. SHELKE, S.D. CHAVAN, HEMANT KUMAR AND P. A. KAHATE

ABSTRACT : The present study was undertaken to evaluate the comparative studies on growth performance of indigenous calves fed with different concentrate mixture. Fifteen indigenous calves were selected and divided into three groups on the basis of nearness to age and body weight. Feeding trials were conducted with three treatments *viz.,* T_1 - Readymade concentrate (Sugras), T_2 - homemade concentrate-I, T_3 - homemade concentrate – II and in all the treatments dry fodder was fed ad. lib and quantity of green fodder + concentrate mixture was provided as per requirement of the basis of feeding standards. It was observed that the higher CP (19.28%) and EE (4.05%) in homemade concentrate-I while, homemade concentrate-II was higher in CF (12.24%) and NFE (60.49). The daily dry matter intake per 100 kg body weight of indigenous calves was higher in T_2 followed T_1 and T_3 treatments. The highest total kg/ day/ head body weight gain of indigenous calves was observed in treatment T_2 (0.392), followed by T_3 (0.336) and lowest in treatment T_1 (0.313). Same trends were noticed in respect to *viz.,* height, length and chest girth of calves. The feeding cost/ kg body weight gain was lowest in T_2 followed by T_3 and T_1 treatment. It was concluded from the results that the feeding of homemade concentrates-I (Maize 30 % + GNC 20% + Wheat bran 28% + Turchuni 20% + Minerals mixture 1% + Common salt 1%) was economical for better growth performance of indigenous calves.

KEY WORDS : Readymade concentrate, Homemade concentrate, Indigenous calves, Adlibitum, Crude protein, Dry matter intake, Body weight

HOW TO CITE THIS PAPER : Mishra, Rajan, Nage, S.P., Shelke, R.R., Chavan, S.D., Kumar, Hemant and Kahate, P.A. (2017). Comparative studies on growth performance of indigenous calves fed with different concentrate mixture. *Res. J. Animal Hus. & Dairy Sci.,* **8**(2) : 113-118 : **DOI: 10.15740/HAS/RJAHDS/8.2/113-118.**

INTRODUCTION

Growth is fundamental and common feature of all living being. Every animal is endowed at birth with certain capacity for growth and production and these inherited characters can be exploited to the fullest extent only with proper feeding and management to obtain adequate growth. Growth depends upon the genetic make upto the extent of only 30 per cent and feeding and management contribute remaining 70 per cent. Concentrate feeding plays an important role in Indigenous calves growth, production, reproduction age at maturity, first conception, first calving in farm animals.

The requirement for growth is more than that for maintenance. Since growth consists of an increase in the size of muscles, other soft tissue and skeleton. Large amount of proteins, minerals and vitamins must be provided and also it is important that, dairy farmer should raise indigenous of higher producing cows. Most of recent researches are diverted towards economical rearing of the calves with different feeding pattern the aim of this to have indigenous calves which develop to a cow of

MEMBERS OF RESEARCH FORUM

Address for correspondence :
Rajan Mishra, Department of Animal Husbandry and Dairy Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, AKOLA (M.S.) INDIA

Associated Authors' :
S.P. Nage, R. R. Shelke, S.D. Chavan, Hemant Kumar and P. A. Kahate, Department of Animal Husbandry and Dairy Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, AKOLA (M.S.) INDIA

optimum age and give maximum returns in respect of milk in her life time without utilizing traditional methods. There are many firms in India which sell compounded livestock ration. However, due to lack of an efficient quality control system, it is difficult to say that this ration contains the required nutrients as per BIS or any other specified standard. There appears to be relationship between the effectiveness of different homemade and readymade feeding in eliciting a response and the diet and nutritional demands of the animal.

Therefore, taking into consideration different homemade and readymade concentrate feedings, important role in growth of indigenous calves, it was felt necessary to conduct investigation to study the effect and cost structure of growth performances of indigenous calves by using readymade and homemade concentrate.

MATERIAL AND METHODS

Present investigation was carried out at Livestock Instructional Farm, Department of Animal Husbandry and Dairy Science Dr. Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, during the year 2016–17. Fifteen indigenous calves were selected for conducting the experiment such that 5 animals in each batch, on the basis of nearness to age and weight basis. These groups were randomly allotted to different treatments presented below. The DCP and TDN requirement were calculated as per feeding standards and fulfilled by providing soybean straw, *Jower kadbi*, green fodder (Hybrid Napier) and concentrate mixture as per treatments. Details of treatments are presented below (Table A).

T_1 – Dry fodder + Green fodder + Readymade concentrate.

T_2 – Dry fodder + Green fodder + homemade concentrate - l

T_3 – Dry fodder + Green fodder + homemade concentrate – ll

Observations recorded:

Chemical analysis of feeds and fodder:

Feed samples were collected for estimating DM, CP, CF, EE, NFE and total ash content. The dry matter percentage was determined as per the procedure recommended by BIS IS: 7874 (Part-I) 1975. Nitrogen percentage was estimated by Kjeldhal's method as per procedure recommended by BIS IS 7874 :(Part I) 1975 and crude protein percentage was calculated in multiplying the percentage of total nitrogen by 6.25. Crude fibre percentage was determined as per procedure recommended BIS IS :(7874) (Part I) 1975. The ether extracts percentage was determined as per the procedure recommended BIS IS: 7474 (part I) 1975. Total ash per cent was estimated as per the procedure recommended by BIS IS (7874) (Part I) 1975. The NFE was calculated by subtracting total sum of crude protein, crude fibre, Ether extract and total ash from 100.

Daily feed/ dry matter intake:

The dry matter intake from feed was quantitatively monitored at weekly interval to assess the consumption of individual animal. It was done at the start of experiment and weekly interval throughout the period.

Growth measurement:

The growth rate of indigenous calves was estimated in terms of gain in body weight. Weekly body weights of individual indigenous calves were recorded on a standard weighing balance 'AVERY' in morning before feeding and watering. The body measurements such as chest girth, body length and height were recorded weekly. The standard procedure was adopted for determining the body measurements as under. Chest girth was estimated from wither to wither point with the help of measuring tape. It was measured from shoulder point to pin bone point with the help of measuring tape.

Table A : Ingredient of homemade and readymade concentrate

Ingredient T_1	Parts	Ingredient T_2	Parts	Ingredient T_3	Parts
Sugras	100	Maize	30	Sorghum	40
		G.N.C.	20	C.S.C.	20
		Wheat bran	28	Wheat bran	18
		Turchuni	20	Turchuni	20
		Minerals mixture	1	Minerals mixture	1
		Common salt	1	Common salt	1
Total	100		100		100

Statistical analysis:

The data obtained was subjected to statistical analysis by following the Randomized Block Design for testing the differences between feed intakes, body weight gain and body measurement as per the procedure recommended by Amble (1975).

RESULTS AND DISCUSSION

The results obtained from in the present investigation are presented and discussed as mentioned below:

Chemical composition of feed stuffs:

The chemical composition of home, readymade concentrate and roughages were analyzed for proximate principle. The average chemical compositions of different feed stuffs are presented in Table 1. The readymade concentrate, homemade concentrate-I, homemade concentrate-II were containing on an average 90.12, 90.10, 90.14 per cent DM, respectively. Homemade concentrate- I was higher in CP (19.28%) and EE (4.05 %) than homemade concentrate-II and readymade concentrate. Homemade concentrate-II was higher in CF content (12.24%) and readymade concentrate was higher in NFE (64.01%) content than homemade concentrate- I and II.

Chemical composition of concentrate homemade-I has more or less feeding value as determined by Jadhav *et al.* (2011) and Naser *et al.* (2011) observed that the chemical composition, (on DM basis) of conventional diet of concentrate mixture was CP (25.26), CF (10.63), EE (5.25), NFE (52.62), total ash (6.24). These values of concentrate mixtures were similar to the present value of readymade concentrate. Nemade and Padalkar (2000) studied the chemical composition of concentrate mixture having DM (90.00), CP (22.71), EE (3.09), CF (5.32), NFE (62.07) and total ash (6.81).

Daily feed/ dry matter intake:

Daily DM intake was calculated from intake of different feeds and data was tabulated and presented in Table 2.

It is evident from the results of Table 2 that the average daily DM intake was 2.84, 3.82 and 3.30 kg per calves in T_1, T_2 and T_3 treatments, respectively. The corresponding daily DM intake per 100 kg body weight was 2.81, 3.19 and 3.02 kg per calves in T_1, T_2 and T_3, respectively. Higher intake of DM per 100 kg body weight was noticed in treatment T_2 and lowest in treatment T_1. Adangale *et al*. (2009) reported that the average daily dry matter intake was higher in T_1 and the values being 3.050, 3.262 and 3.178 kg in T_0, T_1 and T_2, respectively. Yadav and Chaudhary (2010) reported that the crude protein (CP) intake per 100 kg body weight was significantly higher in T_1 as compared to T_3 group.

Table 1 : Chemical composition of feed stuffs (% DM) basis

Particulars	Readymade concentrate (Sugras)	Homemade concentrate- I	Homemade concentrate - II	Soybean straw	Green hybrid napier
DM	90.12	90.10	90.14	90.51	24.16
CP	17.70	19.28	17.94	7.00	7.70
CF	11.68	10.64	12.24	38.32	35.76
EE	2.72	4.05	3.98	1.65	2.40
NFE	64.01	60.19	60.49	41.17	43.98
Total ash	3.89	5.84	5.35	11.86	10.16

Table 2: Average means of daily dry matter intake per calves over an experimental period (kg)

Treatments	Average body weight (kg)	Requirement of daily DMI / 100 (kg) BW	DMI (kg)	Daily DMI / 100 kg BW (kg)
T_1	101.0	2.52	2.84	2.81
T_2	119.4	2.98	3.82	3.19
T_3	109.2	2.73	3.30	3.02
''F'' test	Sig.	-	Sig	Sig
S.E. $\pm$	2.61	-	0.01	0.01
C.D. (P=0.05)	8.52	-	0.029	0.027

Muhammad Sarkar *et al.* (2010) observed that dry matter intake by calves fed fermented wheat straw diets were T_1, T_2, T_3 and T_4 was 3.12, 3.80, 4.23 and 4.26, respectively.

Growth performance of calves:

Growth performance of calves on concentrate feeding was judged on the basis of body weight gain and gain in body measurements such as chest girth, body length and height as recorded in Table 3.

Average daily gain in body weight was higher in treatment T_2 (0.392 kg) followed by T_3 (0.336 kg) and T_1 (0.313 kg). Results of present study are in closed agreement with Adangale *et al.* (2009) and Jamara *et al.* (2014) and Anjum *et al*. (2014) observed average daily weight gain of 0.201, 0.210 and 0.204 kg per day in calves by feeding Results of present study were in close agreement with Ahmad *et al.* (2005) conducted on 30 Sahiwal heifers of similar age of about one year and similar live weight (155-159 kg) to determine the effect of corn steep liquor on growth rate. The total live weight gain during the trial were 273+or-9.73, 270+or-4.86, 268+or-12.37, 261+or-7.23 and 260+or-6.28 in Groups I, II, III, IV and V, respectively.

Average daily gain in chest girth (cm) was higher in treatment T_2 (0.146) followed by T_3 (0.124) and T_1 (0.105). Zanton and Heinrichs (2005); Shelke *et al*. (2011); Jadhav *et al*. (2011) and Jabbar *et al.* (2012) results indicated that wither height and body length were higher (103 and 111 cm vs. 101 and 108 cm) in heifers fed high concentrate comprising high dietary energy.

Average daily gain in length (cm) was higher in treatment T_2 (0.131) followed by T_3 (0.097) and T_1 (0.084). Similar results were observed by Jabbar *et al.* (2012) and Jadhav *et al*. (2011) and. Reported the heifers fed dietary level of ME 124 per cent of NRC acquired higher body length, height and heart girth as compared to those fed other dietary energy levels. Reported by Jadhav *et al*. (2011) the daily dry matter intake per 100 kg body weight of heifers was higher in T_2 followed T_1 and T_3 treatments. Intake of DCP and TDN was higher in T_1 followed by T_3 and lowest in treatment T_2.

Average daily gain in height (cm) was higher in treatment T_2 (0.162) followed by T_3 (0.151) and T_1 (0.113). Yadav and Chaudhary (2010) studied the effect

Table 3: Growth performance of indigenous calves under different treatments during experimental period (Per day)

Treatments	Average gain in B.W. (kg.)	Average gain in chest girth (cm.)	Average gain in length in (cm)	Average gain in height in (cm)
T_1	0.313	0.105	0.084	0.113
T_2	0.392	0.146	0.131	0.162
T_3	0.336	0.124	0.097	0.151
''F'' test	Sig.	Sig.	Sig.	Sig.
S.E. $\pm$	0.02	0.01	0.001	0.01
C.D. (P=0.05)	0.054	0.003	0.002	0.003

Table 4 : Economics of calves feeding under different treatments during experimental period (Rs.)

Sr. No.	Particulars	T_1	T_2	T_3
1.	Quantity of concentrate feed required during experimental period (kg)	382.5	447.75	409.5
	Total cost of concentrate provided during experimental period (Rs.)	8223	8776	7904
2.	Dry fodder (Soybean straw) over experimental period (kg)	675	1035	855
	Total cost of roughages (Rs.)	2025	3105	2565
3.	Green fodder over experimental period (kg)	1350	1575	1440
	Total cost of green fodder (Rs.)	2700	3150	2880
4.	Labour and miscellaneous cost (Rs.)	5400	5400	5400
5.	Total cost of feed (Rs.)	18348	20431	18749
	Total weight gain (kg)	28.20	35.35	30.32
	Total cost /kg body weight gain (Rs.) for all experimental calves of each treatment	650.64	578.78	618.37
	Total cost /kg body weight gain/ calves (Rs.)	130.12	115.75	123.67

of feeding formaldehyde treated groundnut cake on dry matter intake, digestibility of nutrients and body measurements in crossbred heifers. The results revealed that the body measurement parameters were significantly ($p<0.05$) higher in T_3 group as compared to T_2 and T_1 except height in crossbred heifers. Similar trends was reported by, Shelke *et al.* (2011); Jabbar *et al.* (2012) and Iqbal *et al.* (2014) reported that the feeding of silage prepared from sorghum and gliricidia increases height, chest girth and length of heifers.

Cost of feeding:

Cost of feeding was calculated by considering the prevailing market rates of various ingredients, feeds, charges of labour, electricity, etc. and presented in Table 4.

From Table 4 it was observed that total cost of feed more in T_2 group (Rs. 20431) where as the feed cost was less in T_3 (Rs.18348) and T_1 (Rs. 18749), respectively, however, total cost/ kg body weight gain (Rs.) was less in T_2 (578.78) group compare to T_3 (618.35) and T_1 (650.64) groups and total cost/ kg body weight gain/ calves (Rs.) is also low in T_2 followed by T_3 and T_1 group as, (115.75), (123.67) and (130.12), respectively. The present observation are nearer to the observation reported by past research workers Adangale *et al.* (2009) observed that the cost per kg body weight gain was highest in treatment T_0 (Rs. 48.99) and followed by T_1 (Rs. 43.09) and T_2 (Rs. 39.11) and Singh *et al. (*2009) determined that the cost of feeding per kg live weight gain was lower in T_4 (Rs. 24.90) followed by T_3 (Rs. 29.07), T_2 (Rs. 35.02) and T_1 (Rs.39.53) indicating live weight gain was cheaper by Rs. 14.63 in 15 kg green maize fed group (T_4) then in the control group and Anjum *et al.* (2014) observed that the cost per kg of NRC ration fed was rupees (Rs.17.37); stair-step low energy ration was Rs. 13.06 and stair-step high energy ration cost was Rs. 20.12. Overall feed cost incurred on heifers fed on SSF was significantly lower (12%) than the heifers fed as per NRC requirement.

Conclusion:

Homemade concentrate- I (T_2) feeding schedule is sufficient to fulfil the appetite and nutritional requirement of indigenous calves. Maximum growth rate (weight gain) was obtained by feeding homemade concentrate- I (T_2), with green fodder and dry fodder. Significantly more DM intake was noticed in T_2 followed by T_1 and T_3. It indicates the influence of incorporation of homemade concentrate-I, with green fodder and dry fodder which improves the daily DM intake of the experimental calves. Body measurement (chest girth, body length and body height) of indigenous calves under treatment T_2 proved statistically significant effect by feeding different concentrate. The total cost of feeding (Rs./ kg body weight gain/ calves) group of calves was less in T_2 (115.75) as compared to T_3 (123.67) and T_1 (130.12) groups.

LITERATURE CITED

Adangale, S.B., Mitkari, K.R. and Baswade, S.V. (2009). Associative effect of feeding jowar straw in combination with soybean straw to crossbred (HF X Deoni) interse heifer on digestibility and economics. *Indian J. Ani. Res.*, **42** (2): 145-147.

Ahmad, F.M. Shakil and Ahmad, I. (2005). Replacement of cotton seed meal with corn steep liquor in the ration of sahiwal heifers. *JAPS, J. Anim. & Plant Sci.*,**15** (3/4): 76-78.

Amble, V.N. (1975). *Statistical method in animal science*, I[st] Ed. Published by the Indian Society of Agri Stat, New Delhi, India, pp.199-219.

Anjum, M.I., Mirza, I.H. and Saghar, M.S. (2014). Effects of compensatory growth on puberty age in sahiwal cattle heifers fed low followed by high energy based total mixed rations. *J. Anim. & Plant Sci.*, **24** (Suppl. 1): 20-23 ISSN: 1018-7081.

B.I.S. (1975): 7874 Part 1Beauro of Indian standard institute, NEW DELHI, INDIA.

Iqbal, Z., Abdullah, M., Javed, K., Bhatti, J.A., Jabbar, M.A. and Ahad, N. (2014). Comparative performance of sahiwal calves fed whole milk and milk replacer with or without calf starter. *J. Anim. & Plant Sci.*, **24** (Suppl. 1): 48-51 ISSN: 1018-7081.

Jabbar, T.N. (2012). Evaluating varying dietary energy levels for optimum growth and early puberty in sahiwal heifers. *Pakistan J. Zool.*, **44** (3): 625-634.

Jabbar, L., Cheema, A.M., Jabbar, M.A. and Riffat, S. (2012). Effect of different energy levels, season and age on hematological indices and serum electrolytes in growing buffalo heifers. *J. Anim. & Plant Sci.*, **22** (3 Suuppl.): 279-283.

Jadhav, S.S., Shelke, R.R., Chavan, S.D. and Chore, N.S. (2011). Studied on feeding homemade and readymade concentration on performance of heifers. *Res. J. A.H.D. Sci*., **2** (1&2): 60-64.

Jamara, M. S., Mehla, R. K., Singh, M., Ali, M.M. and Chouhan,

N. (2014). Effect of the fed shatavari (*Asparagus racemosus*) on body weight and puberty of sahiwal heifers. *Internat. J. Agric. Sci & Vet. Med.*, **2**(1).ISSN: 2320-373.

Naser, M.S., Bayaz, A.Z., Ramin, S., Ahmadzadeh, A., Golshani, A.A. and Mohebbizadeh, M. (2011). Determining nutritive value of soybean straw for ruminants using nylon bags technique. *Pakistan J. Nutr.,***10** (9): 838-84, ISSN 1680-5194.

Nemade, P.D. and Padalkar, R.D. (2000). Studies the performance of buffalo's heifers on complete diet with Wheat straw and concentrates. *Indian J. Anim. Prod. Mgmt.*, **11**:139-142.

Shelar, S.S. (2004). Effect of feeding soybean straw on growth performance of crossbred heifers. M.Sc. (Ag.) Thesis, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, M.S. (INDIA).

Shelke, R.R., Tad, A. B., Chavan, S.D. and Nage, S. P. (2011). Growth performance of crossbred heifers on feeding silage prepared from sorghum and gliricidia. *New Agriculturist*, **22** (2) : 133-137.

Shelke, R.R., Chavan, S.D. and Kahate, P.A. (2014). Effect of untreated and urea treated soybean straw on feeding value in lactating cow. *Asian. J. Animal Sci,* **9**(2) : 212-214.

Singh, K.K., Das, M.M., Mahanta, S.K., Kumar, Anil and Misra, A.K. (2009). *Practical aspects of mineral nutrition in livestock* In: Das, N., Misra, A.K., Maity, S.B., Singh, K.K. and Das, M.M. (Eds.) Forage for sustainable live stock production. Satish Serial Publishing House, Delhi, India, pp. 404.

Yadav, C.M. and Chaudhary, J.L. (2010). Effect of feeding formaldehyde treated groundnut cake on dry matter intake, digestibility of nutrients and body measurements in crossbred heifers. *AniM. Nutr. Feed Tech.*,**10** : 107-113.

Zanton, G. I. and Heinrichs, A.J. (2005). Feeding high concentrate diets excluded as a management option and an opportunity for heifer growers reduce feed costs. *Asian J. Anim. Sci.,* **10**(3): 95-105.

Zanton, G.I. and Heinrichs, A.J. (2005). Review limit feeding with altered forage to concentrate levels in dairy heifers diet. *Indian J. Dairy Sci.,* **90** : 5580-5586.

Received : *03.07.2017;* ***Revised:*** *17.11.2017;* ***Accepted :*** *28.11.2017*