



Growth performance of Sahiwal heifers fed on *Jowar* straw in combination with soybean straw

Minakshi S. Mahalle, S.D. Chavan and N.S. Mawal

ABSTRACT : This study was conducted to evaluate the growth performance of Sahiwal heifers fed on jowar straw in combination with soybean straw and concentrate mixture using six sahiwal heifers with average initial body weight. The heifers were assigned into three treatments having, T₁ - Jowar straw (Ad.lib) +3kg green fodder+1kg concentrate, T₂ - 50% *Jowar* straw +50% soybean straws + 3kg green fodder +0.750kg concentrate, T₃ -soybean straw (Ad lib) +3kg green fodder +0.500kg concentrate (Dry green and concentrate feeding will be provided on the basis of DCP and TDN required as per feeding standard). Experimental feeding lasted 95 days using switch over design with a period of 27 days per period. The total DM and DMI (% of body weight) intake for T₂ diets were higher than those fed T₁ and T₃ diets. The overall Average Daily Gain (ADG) was higher in T₂ than of T₁ and T₃ were as Average Daily Gain found to be lowest in T₃. The body measurement (chest girth, length and height) were also higher in T₂ compared to those fed T₁ and T₃ diets. Hence, it can be concluded that in 50% *Jowar* straw +50% soybean straws + 3kg green fodder +0.750kg concentrate, enhanced growth performance sahiwal heifers.

KEY WORDS : Growth performance, Weight gain, Body measurement, Sahiwal heifers

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INTRODUCTION

The role of livestock sector is very crucial in the economy of Pakistan because it provides essential food items in the form of milk, meat and eggs. Milk is the largest commodity within livestock sector and the total milk production during the year 2009-10 was estimated to be 44,978 thousand tons (GOP, 2010). Gross value

addition of this sector has increased upto 17.8 per cent as compared to that in previous year (GOP, 2010). Accordingly the demand for high quality food is rising and putting pressure on price of milk. Lifetime productivity of these animals is low because of low growth rate resulting into late maturity and light weight at the onset of production, long dry period and calving interval (Jabbar *et al.*, 2000). Lower growth rate in early life of heifer results in higher age at puberty and thus higher age at first calving. Average age at first calving in Sahiwal cattle is 46 months which is much higher than that of Holstein cows being 29 months (Bashir, 2006; Rehman, 2006). Heifer growth rate and body weight at first calving are of extreme importance in dairy farm management (Sejrsen and Purup, 1997; NRC, 2001). Increased growth rate in heifers can decrease the duration of non-productive

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state (Sejrsen and Purup, 1997). Heifers, fed a high plane of nutrition during pre-pubertal and gestation periods, have a higher live weight which has been shown to be positively correlated with milk production during the first lactation (Ingvarsten *et al.*, 1988). The well grown heifer is actually a good investment to produce more milk in future. They yield more milk, come back in calf earlier and last longer in the milking herd if adequate nutrition is provided and health condition is optimal. Productivity is the outcome of good genes and environment. Environment includes feeding, housing, reproductive management and disease control. Feeding management plays a vital role to improve the productivity of animal and provides a regimen enabling heifer to develop her full lactation potential at the minimum cost. Animal productivity can be increased upto 40 per cent just by manipulating the macro and micro nutrients with existing gene pool (Sarwar *et al.*, 2010). Protein and energy are most critical nutrients influencing animal productive performance under tropical/subtropical environment conditions (Shahzad *et al.*, 2010). If the supply of protein is adequate, then dietary energy is major limiting factor for ruminant growth and protein supplement alone to low energy diet has no effect on growth rate (Mtenga and Madsen, 1992).

MATERIAL AND METHODS

The study was conducted in Department of Animal Husbandry and Dairy Science Post Graduate Institute Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the year 2014-2015. The livestock instruction farm is located on Mumbai-Kolkata national highway number 6 at East of Akola city. Akola is situated at central-East side of Maharashtra state. The six sahiwal heifers were selected on the basis of nearness to age and body weight and these were exposed to three different treatments in each 2 heifers. Experimental feeding lasted 95 days using switch over design with a period of 27 days per period including 7 days gap for reducing residual effect before starting second and third period. The heifers subjected to different groups were fed for twice in day namely T₁- Jowar straw (Ad.lib) +3kg green fodder+1kg concentrate, T₂- 50% Jowar straw +50% soybean straws + 3kg green fodder +0.750kg concentrate, T₃-soybean straw (Ad lib) + 3kg green fodder + 0.500kg concentrate. Care was taken that in all groups, the experimental heifers were similar in respect to size, health, body weight and age. Before the start of experiment all the animal were

deworming against internal and external parasite. The experimental animal was fed with concentrated mixture of respective treatment in period I, II and III per head per days in the morning. The Data were statistically analyzed by Switch over design.

Health and sanitation:

The heifer pens where the heifers were housed during the period of experiment were cleaned daily. The byres and surrounding area were disinfected with phenyl. The help of veterinarian was taken whenever necessary. The heifers were kept in open paddock from 8.00 a.m. to 9.30 a.m. daily.

Data recorded and parameters studied:

Feed intake of each experimental animal was recorded daily. Body weight was taken at weekly interval and body measurement (Heart, girth, length and height) were taken at the end of each period monthly. However, overall performance of sahiwal heifers fed varying levels of feed was also observed on feed intake (kg day⁻¹), dry matter intake (percentage of body weight), average daily gain (g day⁻¹) and body (Heart girth, length and height) measurement (cm).

RESULTS AND DISCUSSION

It is observed from that Table 1, soybean straw, jowar straw, berseem and concentrate were containing 91.21, 91.08, 20.8 and 89.2 DM, respectively. The soybean was containing 7.11, 1.53, 38.31, 41.22, 11.83 per cent, CP, EE, NFE, CF and ash while jowar straw was containing 3.65, 2.90, 52.45, 32.42 and 8.58 per cent CP, EE, NFE, CF and ash, respectively. The contents of nutrient in concentrate were 19.65, 6.55, 60.12, 6.10 and 7.58 per cent CP, EE, NFE, CF and ash. The contents of nutrients in berseem containing 14.6, 1.3, 51.8, 19.6, and 12.7 per cent CP, EE, NFE, CF and Ash. The most significant finding was that soybean straw thrice rich as that of jowar in respect of CP content. Similarly, CF was higher in soybean straw than that of jowar straw, whereas NFE, EE were higher in jowar straw, over soybean straw.

Chemical composition of jowar straw is nearer with that of reported by Bansod *et al.* (2008) observed that the content of CP, CF, EE and NFE in jowar straw as 3.70, 32.45, 2.89, and 52.46, per cent, respectively, slightly lower values of CP and CF, but the values of EE and NFE are in line with present value. Similar observations

Table 1 : Chemical composition of experimental feeds fed to sahiwal heifers (on % DM)

Particulars	Jowar straw	Soybean straw	Berseem	Concentrate
DM	91.21	91.08	20.8	89.2
CP	3.65	7.11	14.6	19.65
EE	2.90	1.53	1.3	6.55
NFE	52.45	38.31	51.8	60.12
CF	32.42	41.22	19.6	6.10
Total ash	8.58	11.83	12.7	7.58

were also noted by Kamble (2006). The present chemical composition values are nearer to the values reported by past research workers Mandal and Banerjee (2009) observed that the content of CP, CF, EE, NFE and TA in berseem as 14.5, 19.7, 1.2, 51.9, and 12.7 per cent, respectively. Yadav and Chaudhary (2010) observed that the content of CP, CF, EE, NFE and TA in berseem as 15.12, 24.96, 2.20, 44.54, and 13.18 per cent, respectively. The present values are appearing between the same values.

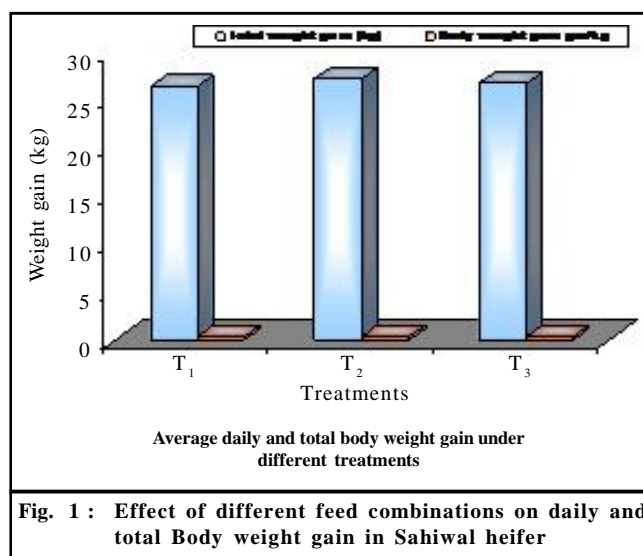
Body weight gain and average daily gain:

The average weights of sahiwal heifers are presented in Table 2. The maximum body weight gain by the heifers was observed in T₂ (214.51), whereas minimum was T₁ (214.08) group. However, the average total weight gain in T₂ was found to be 27.23 higher than T₁ and T₃ groups, respectively. That there was significant difference in weight gain under different treatments. The average final weight gain was highest in T₂ followed by T₃ and T₁ significantly lowest weight gain was recorded in T₁ treatment *i.e.* Jowar straw feeding daily intake of DM was highest in the treatment T₂ which had adequate amount of DCP and TDN to heifers. This situation might have favoured the growth in heifers.

The average daily growth rate was calculated for all groups. The rate of daily live weight gains was observed higher under T₂ (0.336 kg day⁻¹ per heifers) followed by T₃ (0.329 kg day⁻¹ per heifer), T₁ (0.312 kg day⁻¹ per heifer) while, minimum daily live weight was recorded under T₁ (0.312 kg day⁻¹ per heifer) groups, respectively. The present values are nearer to the values reported by past research workers Kumar *et al.* (1996) observed average value of daily body weight gain was 350, 353 and 311 g for sahiwal heifers, respectively. Rodrigues and Barbosa (1999) showed that the average daily weight gain were 0.39 and 0.36 kg/animal/day for animal supplemented with soybean meal with concentrate

Table 2 : Effect of different feed on body weight gain (kg) of sahiwal heifers

Treatments	Average final weight (kg)	Period weight gain (kg)	Daily weight gain g/kg
T ₁	214.08	26.41	0.312
T ₂	214.51	27.23	0.336
T ₃	214.23	26.71	0.329
F test	-	Sig	Sig
S.E.±	-	0.029	0.0007
C.D. (P=0.05)	-	0.089	0.0024

**Fig. 1 : Effect of different feed combinations on daily and total Body weight gain in Sahiwal heifer**

containing 28.7 per cent crude protein, respectively.

Body measurements:

During the experimental period body measurements were taken at the end of each period (cm) *i.e.*, heart girth, length and height were recorded and presented in Table 3 and 4. The highest chest girth, body length and body height were recorded in T₂ and lowest in T₁ followed by T₃ groups, respectively. There was significant difference were observed in heart girth, length and height

Table 3 : Effect of different feeds on chest girth and body length (cm) of sahiwal heifers

Treatments	Average chest girth	Average gain in chest girth	Treatments	Average length	Average gain in body length
T ₁	140.00	8.55	T ₁	118.17	8.11
T ₂	140.12	10.11	T ₂	118.19	8.87
T ₃	140.06	9.69	T ₃	118.12	8.16
F test	-	Sig	F test	-	Sig
S.E. ±	-	0.064	S.E. ±	-	0.034
C.D. (P=0.05)	-	0.207	C.D. (P=0.05)	-	0.110

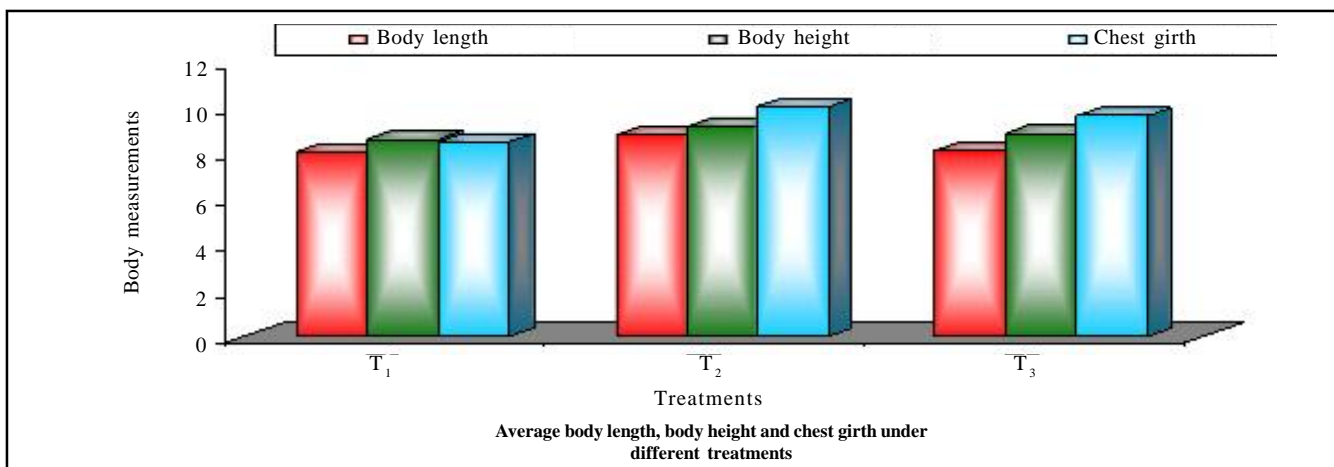


Fig. 2 : Effect of different feed combinations on body length, body height and chest girth in sahiwal heifer

Table 4 : Effect of different feeds on body height (cm) of Sahiwal heifers

Treatments	Average height	Average gain in height
T ₁	118.96	8.69
T ₂	120.16	9.22
T ₃	119.86	8.93
F test	-	Sig
S.E.±	-	0.024
C.D. (P=0.05)	-	0.079

heifers (p<0.05).

The performance of heifers fed on different diet showed gradual increase in height, length and chest girth. However, differences were more or less similar in the different combination of diet which may be due to feeding of complete fed in all the treatment as per the requirements. The increase in body measurement was higher in combination of jowar and soybean. The results of Hosmani and Srivastava (1989) confirm the present trends where he noted increase in the body measurement on soybean diet.

The present observation are nearer to the

observation reported by past research workers. Zanton and Heinrichs (2007) 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. Shelke *et al.* (2011) observed average daily chest girth gain of 0.126, 0.135 and 0.117 cm per day in heifers by feeding silage prepared from sorghum and gliricidia.

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LITERATURE CITED

Bansod, P.H. (2008). Nutritional requirement of gaolao cow. M.Sc. (Ag.) Thesis, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S.).
 Bashir, M.K. (2006). Genetic and phenotypic aspects of some

- performance traits of Nili-Ravi buffaloes in Pakistan. Ph.D. Thesis. Univ. Agri., Faisalabad, Pakistan.
- evaluation of Sahiwal cattle in Pakistan. Ph.D. Thesis. Univ. Agri., Faisalabad, Pakistan
- GOP (Government of Pakistan). 2009-10. Economic Survey of Pakistan . Government of Pakistan. Ministry of Finance. Economic Adviser's Wing, Islamabad.
- Rodrigues, A.A. and Barbosa, P.F. (1999) Effect of protein content of the concentrate in the consumption of cane sugar with urea and weight gain of growing Heifers. *J. Animal Sci.*, **28** : 421-424.
- Ingvarstsen, K.L., Foldager, J., Larsen, J.B. and Ostergaard, V. (1988). Growth and milk yield by Jersey reared at different planes of nutrition, 72Copenhagen, Denmark: Nat. Inst. Anim. Sci. Report 645 (English summary and subtitles).
- Sarwar, N., Malhi, S.S., Zia, M.H., Naeem, A., Bibi, S. and Farid, G. (2010). Role of mineral nutrition in minimizing cadmium accumulation by plants. *J. Sci. Food Agric.*, **90** : 925–937. doi: 10.1002/jsfa.3916.
- Hosmani, S.V. and Srivastava, A. (1989). Pattern of growth and efficiency of nutrient utilization in buffalo calves fed formaldehyde treated soybean. *Indian J. Animal Sci.*, **59** : 1015-1017
- Sejrsen, K. and Purp, S. (1997). Influence of pre-pubertal feeding level on milk yield potential of dairy heifers: a review. *J. Animal Sci.*, **75**: 828–835
- Jabbar, M.A., Hussain, M. and Pasha, T.N. (2000). Effect of different dietary energy levels on growth and onset of sexual maturity in Sahiwal heifers. 21st Annual Report of Livestock Production Research Institute. pp. 76–77. 7 March 2000. Bahadurnagar, Okara, Pakistan.
- Shahzad, K., Rehman, K.U. and Abbas, M. (2010). HR practices and leadership styles as predictors of employee attitude and behavior: Evidence from Pakistan. *European J. Soc. Sci.*, **14**(3):417-426.
- Kamble, D.M. (2006). Effect of feeding soybean straw on quality of milk of crossbred cows. M.Sc. (Ag.) Thesis, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S.).
- 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.
- Mtenga L.A. and Madsen A. (1992). Experiences in protein supplementary feeding of weaned lambs and goats in Tanzania: The issue of dietary energy. In: Proceedings of First Conference of the African Small Ruminant Network, 10–14 December 1990, Nairobi Kenya, pp. 387–399
- Yadav, C.M. and Chaudhary, J.L. (2010). Effect of feeding protected protein on growth performance and physiological reaction in crossbred Heifers. *Indian J. Anim. Nutr.*, **27**(4): 401-407.
- NRC (2001). Nutrient requirements of dairy cattle. 7th Ed. National Academy Press; Washington, DC, USA: 2001
- Zanton, G.I. and Heinrichs, A.J. (2007). The effects of controlled feeding of a high-forage or high-concentrate ration on heifer growth and first-lactation milk production. *J. Dairy Sci.*, **90** : 3388–3396.
- Rehman, Z.U. (2006). Inter-herd performance and genetic

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