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## Effect of feeding jowar straw in combination with soybean straw on growth performance of crossbred calves

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**Abstract**

The study entitled “Effect of feeding jowar straw in combination with soybean straw on the growth performance of crossbred calves” was conducted for period of 90 day. Twenty Crossbred calves were divided into four groups on the nearness of age and weight. Four feeding treatment were studied namely T<sub>1</sub> (Jowar straw adlib + 3 kg berseem + 1kg concentrate), T<sub>2</sub> (50% Jowar straw adlib + 50% Soybean straw adlib + 3 kg berseem +0.750 kg concentrate), T<sub>3</sub> (Soybean straw adlib +3 kg berseem +0.500 kg concentrate) was fulfil requirement of sahiwal calves in all treatments. It was observed that soybean containing 7.15, 1.52, 38.29, 41.29, 11.86 per cent, CP, EE, NFE, CF and ash while jowar straw was containing 3.37, 2.48, 43.50, 36.23, and 14.42 per cent CP, EE, NFE, CF and ash respectively. Daily DM intake differed significantly between the treatments. The calves from T<sub>2</sub> groups consumed more DM than that of T<sub>1</sub> and T<sub>3</sub> calves. The average daily intake was 5.363, 5.388 and 5.355 kg/day/calves in T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> groups respectively. This trend thus indicated that there was increase in the daily DM intake when jowar straw was incorporated as roughage in the rations of calves. Weight gain per day was found higher in combination feeding of jowar and soybean straw. All the calves exhibited satisfactory growth rate 312 to 336 g per day and differences were significant. The per kg gain of body weight was higher in T<sub>2</sub> treatment. It was over experimental result, the treatment T<sub>2</sub> showed better and desirable result as compared with T<sub>1</sub>, T<sub>3</sub> treatment. There for feeding cost was desirable. Growth rate was higher in calves feed combination of jowar and soybean straw than sole feed of jowar and soybean straw was found economical for gain in weight in crossbred calves.

**Keywords:** Crossbreed calves, jawar straw, soybean straw, dry matter, body weight

**Introduction**

India is an agricultural country and livestock plays an important role in Indian agriculture. In all the livestock, dairy animal is known as an efficient producer of foods for human being. In India, dairy industry contributes major economic role. Agro-industrial production decides the socio-economic status of the country.

Soybean (*Glycine max*) crop is rich in carbohydrate, fat, protein, minerals and vitamin and therefore, can serve as gift to undernourished human population as well as livestock. It is leguminous plant and every part of this crop is useful to animals. Most of the crop residues are fibrous, of low energy and have very little protein and minerals. The feeding of straw in combination with concentrate mixture improves growth and performance of crossbred calves. Hence, the feeding of soybean straw with jowar straw and concentrate mixture has been proposed with an objective to improve weight gain and body measurements (Kale *et al.*, 2009) [10].

Jowar (*Sorghum bicolor*) is a genus of flowering plants in the grass family Poaceae. One species is grown for grain, while many others are used as fodder plant, either cultivated in warm climates worldwide or naturalized, in pasture lands. One species, *Sorghum bicolor* native to Africa with many cultivated forms now is an important crop worldwide, used for food, animal fodder, the production of alcoholic beverages, and biofuel. In the early stages of the plant’ growth some species of sorghum can contain level of hydrogen cyanide, hordenine and nitrates which are lethal to grazing animal. Sorghum supplies numerous essential nutrients in rich content including protein, fiber, vitamin B and several dietary minerals, including iron and manganese.

Soybean and jowar straw are major roughage source among these by products for livestock feeding but due to low nitrogen, high fiber and lignin contents, it cannot meet even the maintenance requirement of ruminants on sole feeding. Feeding of complete feed ensures mixing of required proportion of roughages and concentrate into a uniform blend to supply adequate balanced ration, avoid refusal of unpalatable ingredients. Therefore, an attempt was made to evaluate the effect of incorporation of jowar and soybean straw at graded levels in complete feed on voluntary intake and utilization of nutrients in heifers (Walkunde *et al.*, 2009). With the introduction of protein and oil based industries in India, soybean cultivation has taken greatest strides during past few years. Soybean occupies an intermediate position between legumes and oil seeds and called a miracle "Golden beans", of the 20<sup>th</sup> century. It is also known as "Gold of soil" due to various advantages such as easy cultivation, higher beneficial cost ratio, less requirement of nitrogenous fertilizer and labour, beneficial effect on following crops and conservation etc. Soybean has maximum nutritive value. It contains 20.21% oil, 41.21% protein and carbohydrates with vitamins A, B, C, D, E, K and all other essential amino acids.

### Research methods

The present investigation on effect of jowar straw in combination with soybean straw on the growth performance of crossbred calves was undertaken at Livestock Instructional Farm, of Department of Animal Husbandry and Dairy Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the year 2017-2018, for a period of 90 days. The

material used and methods employed for this investigation is presented in the following pages under appropriate heads. Twenty crossbred calves were selected and divided into 4 groups on the basis of nearness to the age and body weight. As per treatments requirement feed was prepared by using various ingredients and quantities as shown in below.

### Preparation of experimental feeds

The ingredients used for feeding of experimental crossbred calves were concentrate mixture, green fodder and dry roughages. 100% Jowar straw with 3kg green fodder and concentrate mixture were used for feeding in treatment "T<sub>1</sub>". 60% jowar straw and 40% soybean straw with 3kg green fodder and concentrate were used for feeding in treatment "T<sub>2</sub>". 40% jowar straw and 60% soybean straw with 3kg green fodder and concentrate were used for feeding in treatment "T<sub>3</sub>". And 100% soybean straw with 3kg green fodder and concentrate mixture were used for feeding in treatment "T<sub>4</sub>" respectively.

### Research findings and analysis

It is essential to include quality feeds in the ration of animals for maintaining their production and productivity. The term quality implies to feed physical texture and chemical composition which has direct impact on its palatability and in turn supply of nutrient to animal body. Therefore, chemical composition is one of the most important indexes of nutritive value of feed. With this view the feed stuffs were analysed for proximate principles and the data were established in Table 1.

**Table 1:** The present chemical composition values are nearer to the values reported by past research workers.

Particulars	Jowar straw	Soybean straw	Berseem (Green fodder)	Concentrate (Sugras dry ration)
DM	90.20	87.56	22.25	91.21
CP	2.55	6.25	14.5	18.90
EE	2.14	1.80	1.5	5.12
NFE	49.22	42.18	51.2	61.22
CF	37.67	39.32	20.1	10.18
Total Ash	8.42	10.45	12.7	4.58

From the Table 1, it was observed that jowar straw, soybean straw, Berseem and concentrate were containing 90.20, 87.56, 22.25 and 91.21 DM respectively. The jowar straw was containing 3.55, 2.14, 49.22, 43.21, 8.42 per cent, CP, EE, NFE, CF and ash while soybean straw was containing 6.25, 1.80, 42.18, 39.32 and 10.45 per cent CP, EE, NFE, CF and ash respectively. The contents of nutrient in concentrate were 18.90, 5.12, 61.22, 10.18 and 4.58 per cent CP, EE, NFE, CF and ash. The contents of nutrients in berseem containing 14.5, 1.5, 51.2, 20.1, and 12.7 per cent CP, EE, NFE, CF and Ash. The most significant finding was that soybean straw double 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.

The soybean straw was fed with jowar straw to the crossbred calves in present study, thereby, the soybean roughage might have provided the different nutrients with that of jowar straw to crossbred calves.

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 were also noted by Kamble (2006) [11].

Chemical composition of soybean straw is nearer with that of reported by Shelar (2004) observed that the content of CP, CF, EE and NFE in soybean straw as 7.04, 41.20, 1.52, and 38.29, per cent respectively, slightly higher values of CP, CF, EE and NEF than the present value. Similar observations were also noted by (Singh *et al.*, 2005; Kamble 2006) [5, 11, 13, 19, 24].

Chemical composition of soybean straw is nearer with that of reported by Baswade *et al.*, (2007) [1, 16] observed that the content of DM, CP, CF, EE, NFE and total ash as 89.15, 7.75, 38.30, 1.19, 39.82 and 12.97 percent respectively on DM basis, slightly higher value of CP, CF, EE, NFE and total ash than present value.

Chemical composition of soybean straw is nearer with that of reported by Adangale *et al.*, (2009) [1, 10, 16] observed that studied the chemical composition of concentrate DM, CP, CF, EE, NFE and ash as 90.18, 19.17, 10.46, 3.42, 51.55 and 5.58 percent respectively.

### Daily DM intake

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

**Table 2:** Adjusted means of daily dry matter intake per calf over an experimental period (kg)

Treatments	Average body weight (kg)	Daily dry matter intake (kg)	Daily dry matter intake 100 kg body weight
T <sub>1</sub>	214.08	5.363	2.513
T <sub>2</sub>	214.51	5.388	2.518
T <sub>3</sub>	214.23	5.355	2.507
'F' test	-	Sig	Sig
SE (M) $\pm$	-	0.009	0.011
CD at 5%	-	0.0027	0.038

It was noted that the daily DM intake was differing significantly between the treatments. The calf from T<sub>2</sub> groups consumed more DM than that of T<sub>1</sub> and T<sub>3</sub> calf. The average daily intake was 5.363, 5.388 and 5.355 kg/day/calf in T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> groups respectively. This trend thus indicates that there was increase in the daily DM intake when soybean straw was incorporated as roughage in the rations of calves.

However, the past research workers reported Homani and Srivastava (1989) reported reduction in DM intake of animal on soybean based diet. This observation does agree with the present trend. Thus the inclusion of soybean straw in the ration of calf was beneficial to raise the intake and could form as alternative to jowar straw.

It was evident from the results of Table 1 that average daily intake of dry matter was 5.363, 5.388, and 5.355 kg per calf T<sub>1</sub>, T<sub>2</sub>, and T<sub>3</sub> treatment, respectively. It was noted that the daily DM intake was differing significantly between the treatments. The calf from T<sub>2</sub> groups consumed more DM than that of T<sub>1</sub> and T<sub>3</sub> calves. The average daily intake was 5.363, 5.388, and 5.355 kg/day/calf in T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> groups, respectively. This trend thus indicates that there was increase

in the daily DM intake when soybean straw was incorporated as roughage in the rations of calf. These trends therefore indicate the feeding of soybean straw to heifers as a source of roughage had not affected dry matter intake. The present intake values are nearer to the values reported by past research workers like Das *et al.*, (2012) reported that the average daily dry matter intake was higher in T<sub>2</sub> and the values being 5.89, 6.34 and 5.93 kg in T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> respectively. On the other hand Iraira *et al.*, (2012) reported the intake of 5.1 and 5.3 v. 4.7 and 5.0 kg dry matter (DM)/day, respectively. Yadav and Chaudhary (2010) [5, 28] reported that the crude protein (CP) intake per 100 kg body weight was significantly higher in T<sub>1</sub> as compared to T<sub>3</sub> group.

### Growth performance of calves

The Growth performance of calves on jowar and soybean straw feeding was judged on the basis of body weight gain and gain in body measurement. The results obtained in this regard are discussed in the following table

**Table 3:** Effect of different feeding treatment on body weight gain (kg)

Treatments	Average initial weight (kg)	Average final weight (Kg)	Period weight gain	Daily weight gain
T <sub>1</sub>	187.67	214.08	26.41	0.312
T <sub>2</sub>	187.28	214.51	27.23	0.336
T <sub>3</sub>	187.52	214.23	26.71	0.329
F test	-	-	Sig	Sig
SE (M) $\pm$	-	-	0.029	0.0007
C.D. at 5%	-	-	0.293	0.0024

It was observed from the Table 3. That there was significant difference in weight gain under different treatments. The average final weight gain was highest in T<sub>2</sub> followed by T<sub>3</sub> and T<sub>1</sub> significantly lowest weight gain was recorded in T<sub>1</sub> treatment i.e. jowar straw feeding daily intake of DM was highest in the treatment T<sub>2</sub> which had adequate amount of DCP and TDN to heifers. This situation might have favoured the growth in heifers. The average daily body weight gain was 0.336, 0.329 and 0.312 kg per day in T<sub>2</sub>, T<sub>3</sub> and T<sub>1</sub> treatment, respectively. The present values are nearer to the values reported by past research workers Kumar *et al.*, (1996) [6, 8] 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 containing 28.7 % crude protein, respectively. Adangale (2009) [1, 10, 16] observed average daily weight gain of 0.201, 0.210 and 0.204 g per day in calves by feeding jowar straw with combination of soybean straw. The values of present studies are higher than reported past workers. Singh and Agrawal (2001) [5, 13, 19, 24] showed that the average live weight gain was also significantly higher 370 g/d in T<sub>1</sub> and compared to T<sub>3</sub> 351 g/d.

### Conclusion

It is concluded that the feeding of jowar straw in combination with soybean straw meet the maintenance and growth requirement of experimental crossbred calves. The feed intake

recorded was sufficient to fulfil the dietary requirement and appetite of the crossbred calves. Significantly more dry matter intake was noticed in T<sub>2</sub> followed by T<sub>1</sub> and T<sub>3</sub>. Maximum growth rate (Body weight gain) was obtained by feeding of treatment T<sub>2</sub>.

Economic point of view jowar straw can be replaced by soybean straw without adverse effect on health and cost of feeding.

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