

## COMPARATIVE STUDY ON PARTIAL AND COMPLETE REPLACEMENT OF GREEN JOWAR WITH HYDROPONIC JOWAR AND THEIR EFFECT ON THEIR HEMATOLOGICAL PARAMETERS IN OSMANABADI DOES

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**Abstract:** Under the scenario of water scarcity the best alternative to the field Jowar is hydroponic Jowar. Study was planned to compare the partial and complete replacement of green Jowar with hydroponic Jowar and their effect on their hematological parameter in Osmanabadi does. In most part of Maharashtra state, Jowar is an important grain crop. Osmanabadi goat is an important goat breed of Maharashtra because of their adaptability and good disease resistance power. The research was carried out on 21 does. Jowar was grown from the same seeds in field and in hydroponic machine. The T<sub>0</sub> group was fed with control diet. The T<sub>1</sub> group was fed with the 50% replacement of field Jowar with hydroponic Jowar and T<sub>2</sub> group was fed with 100% replacement of field Jowar with hydroponic Jowar. The average value of the RBC in the group T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub> was 11.77± 0.29, 12.20± 0.34 and 12.34± 0.18. The average value of the WBC in the group T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub> was 5.79± 0.24, 5.82± 0.16 and 6.23± 0.17. The average value of the Hemoglobin in the group T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub> was 8.39± 0.18, 8.74± 0.21 and 8.98± 0.12. The study indicated positive effect of feeding of hydroponic Jowar fodder in goat health.

**Keywords:** Jowar, hydroponic, hemoglobin, RBC, WBC, Osmanabadi doe.

### Introduction

Jowar is the 5<sup>th</sup> most important crop in the world after rice, wheat, maize, and barley. Sorghum (*Sorghum bicolor*) locally called Jowari in Vidharbha region of Maharashtra state of India. Jowar crop is environmentally friendly because of its water effectiveness and requires little fertilizer or pesticides with biodegradable nature (Dogget, 1989). Particularly in Vidarbha region the climate and topography is more promotive to Jowar production, and hence most part of Maharashtra state including Marathawada, Vidarbha and Southern Maharashtra had a privilege of sorghum growing. Fodder sorghum has also been incorporated by government of Maharashtra, in forage of animal all stakeholders during past few decades, by distribution of fodder Jowar seed to poor farmers, under various scheme. When compared to non-sprouted seeds, sorghum sprout have more nutritive values and enhance level of lysine, methionine and tryptophan. Through in the hydroponic growing process, some

chemical and structural changes take place within the cereal grain (Ikediobi 1989). Hydroponic Jowar contain higher number of antioxidant as compared to the other sprouted grain, therefore it affects the hematological parameter.

### **Materials and Methods**

The total duration of research work is 90 days, from month of May 2018 to July 2018. Experiment was conducted at Cattle Breeding Farm premises of college in an experimental animal shed.

Animal was selected with similar body parameter and distributed randomly into the treatment groups. The average body weight of the does was between 3-4 years. The female animals selected were in mid and late gestation. Animals were dewormed with Fenbendazole one month before start of the experiment.

Green Jowar fodder was cultivated at fodder unit No. 3 and for hydroponics Jowar cultivation germination unit was created which equipped with stands and trays. The unit was computerized to control temperatures, ventilations, irrigations and lighting system. In the germination unit, 11 trays on stands were planted with hydroponics grains. Each tray was planted with 1 kg of Jowar grain sprout. Metal trays of 90 x 30 x 4 cm were used in this experiment. The proximate analysis of the feed was carried out as per AOAC 1990.

The treatment diet was given to each experimental group as 100% Field grown Jowar fodder (FGS) + concentrate + dry roughage, 50% Field grown Jowar fodder + 50% hydroponic Jowar fodder + concentrate + dry roughage and 100% hydroponic grown Jowar fodder (HGS) + dry roughage + concentrate.

Feeds were given two times to goats at morning and evening at one hour gap duration between each type of feed. Blood samples were collected at morning hours at 6.30 am from jugular vein. Samples were collected every 15 days interval. 1.5 ml blood was collected from each doe. Samples were collected in K 3 EDTA type vacuare tubes and stored at -20 °C until utilized for analysis. Hemoglobin (gm %), total leukocyte count (thousands / $\mu$ l), total erythrocyte count concentration (millions / $\mu$ l) estimation was carried by using the auto-analyzer i.e. Horiba and the CBC kit used for the estimation of these was ABX Vet pack.

### **Results and Discussion**

The results obtained in the present experiment are presented in the tables below.

#### **Proximate Analysis**

The proximate analysis of the type of feed is presented as below (Table 1).

**Table 1: Proximate Analysis of Ration Ingredients**

	<b>FGS</b>	<b>HGS</b>	<b>Dry Roughages</b>	<b>Concentrates</b>
CP	09.86	27.87	96.58	95.84
CF	08.75	05.25	13.125	01.75
EE	29.00	32.40	14.20	59.00
NFE	04.33	01.76	03.23	01.30
Total Ash	54.30	48.24	51.57	29.45
	03.55	02.35	18.00	08.50

In the present experiment, on dry matter basis CP % of Hydroponic Jowar was higher than that of green cultivated Jowar and gram straw (Table 1). Also percentage of DM in hydroponic Jowar was lower than that green fodder Jowar. Those finding was in accordance with Sneath and McIntosh (2003). During soaking and germination, seeds lose dry matter (DM) as they use their own energy reserves for growth. From the present analysis of fodder, different changes in composition of proximate analysis were noticed. The possible reason for such type of changes in composition might be due to the methodology and artificial beneficial environment of Hydroponic Jowar. Previous study of Saidi and Omar (2015) reported that on feeding hydroponically grown Barley green fodder, to interrogate the biological and economical values of hydroponic barley (HB) in Lactating Awassi Ewes. They observed that germination of barley resulted in about 18% loss in the DM and 40% increases in CP from day 1 to day 8. Also Helal (2015) reported sprouted barely with increase CP content.

During cultivation of hydroponic Jowar for feeding to does, 1 kg of Jowar seed yield was 7.5 kg of fodder within 7 days. Present finding to yield 7.5 kg hydroponic Jowar from 1kg seed was in accordance with previous finding of Saidi and Omar (2015) who also observed that from 1 kg of barely grain about 7.5 kg hydroponically grown green fodder was produce. Similarly, Chichame and Chahande (2017) reported that 7-10 kg of hydroponic maize fodder was cultivated from 1 kg of maize seeds. The yield of hydroponics was depending on the variety of seeds used and variation in the methodology which was adopted.

The results of analysis of variance to see the effect of different treatments on hematological parameters are presented in table 2.

**Table 2: Analysis Of Variance to See the Effect of Treatment on Hematological Parameters**

	Haemoglobin		WBC	RBC
S. V.	df	mss	mss	mss
Treatment	2	4.30551 <sup>NS</sup>	2.994057 <sup>NS</sup>	5.068073 <sup>NS</sup>
Error	144	1.52574	1.866133	8.838196
Total	146			

**Average of Hemoglobin within Treatments:**

The mean values of the hemoglobin are presented in table 3.

**Table No. 3: The Average  $\pm$  SE of Hemoglobin of does (g/dl) at 15 day Interval**

	F1	F2	F3	F4	F5	F6	F7	Total
T <sub>0</sub>	8.14 $\pm 0.53$	8.27 $\pm 0.40$	8.44 $\pm 0.50$	8.54 $\pm 0.44$	8.39 $\pm$ 0.47	8.26 $\pm$ 0.46	8.70 $\pm$ 0.47	8.39 $\pm$ 0.18
T <sub>1</sub>	8.24 $\pm 0.55$	8.40 $\pm 0.46$	8.63 $\pm 0.55$	9.03 $\pm 0.54$	8.80 $\pm 0.54$	8.90 $\pm 0.62$	9.17 $\pm 0.58$	8.74 $\pm 0.21$
T <sub>2</sub>	8.83 $\pm 0.23$	8.86 $\pm 0.11$	8.94 $\pm 0.23$	9.21 $\pm 0.31$	8.91 $\pm 0.37$	9.00 $\pm 0.42$	9.11 $\pm 0.42$	8.98 $\pm 0.12$
Total	8.40 $\pm 0.27$	8.51 $\pm 0.21$	8.67 $\pm 0.26$	8.93 $\pm 0.26$	8.70 $\pm 0.27$	8.72 $\pm 0.30$	9.00 $\pm 0.29$	8.70 $\pm 0.10$

Hydroponic supplemented group t1 and t2 shows comparatively higher hemoglobin concentration than non-supplemented group. However, non-significant difference was observed among the groups. The value of T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub> was 8.39 $\pm$  0.18, 8.74 $\pm$  0.21 and 8.98 $\pm$  0.12, respectively. Similar opinion was made earlier by Marsico et al. (2009) in goat and Micera et al. (2009) in sheep with use of hydroponic barley and Limba (2015) in Rathi cow with use of hydroponic maize. Recent study of Chichame and Chahande (2017) on Osmanabadi goat in Vidarbha the region also opined similarly with significant differences. In many ailments and immune deficiencies in animals the Hb concentration is found to drop. Drop in Hb concentration in blood of the animals, as tested in the laboratory as a diagnostic aid indicates some sort of illness. Similarly its increase in the blood is indicative of the improvement in health of the animals. In the present study the increase in Hb concentration in the blood of the experimental animals may be regarded as the beneficial health effect of incorporation of hydroponic fodder in the diet of the goats. The improvement in Hb as also reported by earlier researchers might be attributed to the simplification of the compound nutrients in grains that occur at sprouting.

**Average of erythrocyte count within treatments:**

The mean values of the erythrocyte count were presented in table 4.

**Table 4: The Average  $\pm$  SE of RBC of does (millions/micro litter) at 15 day interval**

	<b>F1</b>	<b>F2</b>	<b>F3</b>	<b>F4</b>	<b>F5</b>	<b>F6</b>	<b>F7</b>	<b>Total</b>
<b>T0</b>	10.51 $\pm$ 0.61	10.78 $\pm$ 0.75	11.10 $\pm$ 0.70	12.33 $\pm$ 0.67	12.39 $\pm$ 0.72	12.19 $\pm$ 0.64	13.15 $\pm$ 0.72	11.77 $\pm$ 0.29
<b>T1</b>	11.75 $\pm$ 0.86	12.17 $\pm$ 0.90	12.25 $\pm$ 0.83	11.69 $\pm$ 0.88	12.26 $\pm$ 0.99	12.78 $\pm$ 0.92	12.52 $\pm$ 0.76	12.20 $\pm$ 0.34
<b>T2</b>	12.02 $\pm$ 0.52	12.08 $\pm$ 0.48	12.30 $\pm$ 0.43	12.08 $\pm$ 0.40	12.37 $\pm$ 0.39	12.34 $\pm$ 0.36	13.15 $\pm$ 0.51	12.34 $\pm$ 0.18
<b>Total</b>	11.43 $\pm$ 0.42	11.68 $\pm$ 0.44	11.88 $\pm$ 0.41	12.03 $\pm$ 0.40	12.34 $\pm$ 0.43	12.45 $\pm$ 0.40	12.94 $\pm$ 0.39	12.11 $\pm$ 0.16

Numeric improvement in RBC concentration was observed among the groups. RBC concentration found similar trend of result as that of the Hb. RBC concentration differs non-significantly among the groups. The RBC concentration in non-supplemented group T0 (11.77 $\pm$  0.29) was comparatively lower than Hydroponic Jowar supplemented group T1(12.20 $\pm$  0.34) and T2 (12.34 $\pm$  0.18). Similar opinion was made earlier by Marsico et al. (2009) in goat and Micera et al. (2009) in sheep with use of hydroponic barley. Recent study of Chichame and Chahande (2017) on Osmanabadi goat in Vidarbha the region also opined similarly with significant differences.

**Average of leukocyte count within treatments:**

The mean values of the leukocyte count were presented in table 5.

**Table 5: The (Average  $\pm$  SE) of WBC of does thousands/micro litter at 15day interval**

	<b>F1</b>	<b>F2</b>	<b>F3</b>	<b>F4</b>	<b>F5</b>	<b>F6</b>	<b>F7</b>	<b>Total</b>
<b>T<sub>0</sub></b>	5.96 $\pm$ 0.73	5.94 $\pm$ 0.69	6.03 $\pm$ 0.72	5.90 $\pm$ 0.72	5.47 $\pm$ 0.50	5.36 $\pm$ 0.48	5.86 $\pm$ 0.50	5.79 $\pm$ 0.24
<b>T<sub>1</sub></b>	5.60 $\pm$ 0.21	5.54 $\pm$ 0.35	5.57 $\pm$ 0.40	5.69 $\pm$ 0.47	5.89 $\pm$ 0.38	5.77 $\pm$ 0.30	6.67 $\pm$ 0.60	5.82 $\pm$ 0.16
<b>T<sub>2</sub></b>	5.93 $\pm$ 0.50	6.16 $\pm$ 0.50	6.17 $\pm$ 0.44	6.10 $\pm$ 0.43	6.54 $\pm$ 0.43	6.31 $\pm$ 0.46	6.40 $\pm$ 0.26	6.23 $\pm$ 0.17
<b>Total</b>	5.83 $\pm$ 0.31	5.88 $\pm$ 0.31	5.92 $\pm$ 0.32	5.90 $\pm$ 0.32	5.97 $\pm$ 0.27	5.81 $\pm$ 0.26	6.31 $\pm$ 0.28	5.95 $\pm$ 0.11

Higher WBC concentration in the does of Hydroponic maize supplemented group T1 (5.82 $\pm$  0.16) and T2 (6.23 $\pm$  0.17) was observed as compared to non-supplemented group T0 (5.79 $\pm$  0.24). The difference in WBC in all groups found to be non-significant. Similar opinion was

made earlier by Marsico et al. (2009) in goat and Micera et al. (2009) in sheep with use of hydroponic barley. Recent study of Chichame and Chahande (2017) on Osmanabadi goat in Vidarbha the region also opined similarly with significant differences.

The study indicated that the hydroponic Jowar supplementation does not have any negative effect on hematological parameter and on health of animal. Moreover, Health of the does is seen improving as seen from the analysis of blood samples, leads to the indication of incorporation of hydroponic fodder in the diet of the goat is beneficial.

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