ISSN: 2456-2912
VET 2024; 9(1): 531-533

www.veterinarypaper.com
Received: 12-10-2023
Accepted: 15-11-2023

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Effect of feeding of hydroponics maize fodder on haemato-biochemical parameters in Rathi calves

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Abstract
Twenty male Rathi calves (6-12 months) and average body weight (96 kg) were distributed by randomized block design on the basis of body weight into five groups of four animals in College of Veterinary and Animal Sciences, Bikaner (RAJUVAS). The animals in group T_1 (control) were fed 1.5 kg concentrate mixture (CP 20%), 2.5 kg groundnut straw and wheat straw *ad lib*. In group T_2, 75% of CP was met through concentrate mixture (1.125 kg) and rest through hydroponic maize fodder (2.63 kg) along with 2.5 kg groundnut straw and *ad lib.* wheat straw was given. Whereas, in group T_3, 50% of CP was met through concentrate mixture (0.75 kg) and rest through hydroponic maize fodder (5.27 kg) and 2.5 kg of groundnut straw was given along with *ad lib.* wheat straw. In group T_4, 25% of CP was met through concentrate mixture (0.375 kg) and remaining by hydroponic maize fodder (7.9 kg) and 2.5 kg groundnut straw with *ad lib.* wheat straw was offered. In T_5 group, CP requirement was met through 10.54 kg hydroponic maize fodder and 2.5 kg groundnut straw along with wheat straw was given *ad lib.* Daily allowance of concentrate and roughage were offered to meet their nutrient requirements (ICAR, 1985). Haemato-biochemical parameters *viz*., Hb, PCV, blood glucose, blood urea nitrogen, total serum protein and serum creatinine were observed to be in the normal range and there was no significant difference among treatment groups. The results indicated that hydroponics fodder in Rathi calves have no adverse effect over haemato-biochemical constituents.

Keywords: Rathi calves, hydroponics maize fodder, haemato-biochemical parameters

Introduction
For production and reproductive performances green fodder is of vital importance in animals but small size land holdings, water scarcity, salinity, high evapotranspiration rate, less soil water holding capacity, more labour requirement, more growth time, absence of same quality throughout the year, fertilisers requirement, climate changes are the major obstacles in green fodder production. In order to surmount all the constrain hydroponics technology is the most suitable upcoming alternate (Sneath and Mc Intosh, 2003) [17]. This technique can be used for production of many forage crops in a hygienic environment free of chemicals like insecticides, herbicides, fungicides and artificial growth promoters (Jensen and Malter, 1995; Al-Hashmi, 2008; Al-Karaki and Al-Momani, 2011) [11, 2, 3]. 1 kg of grain yields 6 to 10 kg of fresh green sprouts in hydroponic system irrespective of weather and at any time of year. Development of this planting system has enabled production of fresh forage from oats, barley, wheat and other grains. Depending on the type of grain, forage mat reaches between 15-30 cm height where production rate ranged about 7 to 9 kg of fresh forage corresponding to 0.9 to 1.1 kg of dry matter (Mukhopoad, 1994; Al-Ajmi *et al*., 2009) [15]. The whole product is then fed to the animals and the empty space in the chamber is used to germinate a new set of seeds (Mukhopad, 1994) [15]. Hydroponic fodder has high feed quality, rich with proteins, fibres, vitamins and minerals (Bhise *et al*., 1988; Chung *et al*., 1989) [4, 7] with therapeutic effects on animals (Kanauchi *et al*., 1998; Boue *et al*., 2003).) [12, 5]. It is also rich source of antioxidants in form of Beta-carotene, Vitamin A, E and C (Shipard, 2005) [16]. Higher levels of limiting amino acid, lysine is present (Chavan and Kadam, 1989) [6] and level of phytic acid is found to be reduced which is anti nutritional factor present in grains due to sprouting (Chavan and Kadam, 1989; Shipard, 2005) [6, 16]. 2-3% water is required in hydroponics technology with respect to fodder grown in field conditions (Al-Karaki and Al-Momani, 2011) [3]. This technology has proved to be beneficial for arid and semi arid regions.

Thus the experiment was performed to find out the effect of feeding hydroponics maize fodder on haemato biochemical parameters in Rathi calves in the arid region of Rajasthan (India).

Materials and Methods

The production of hydroponics maize was done in a hydroponics chamber of Ayurvet Progreen machine with automatic irrigation facility. Overnight soaking of maize seeds was done following by its distribution in trays. Trays were placed in the top most row of growth chamber and then were shifted to the respective lower rows on each day. The plants were grown for the period of 7 days and were fed to animals on 8th day.

Twenty male Rathi calves of age group 6-12 month of average body weight 96 kg were divided into five equal groups on the basis of their body weight (mean body weight 95.00, 95.24, 96.41, 96.54 and 96.98 kg in T_1, T_2, T_3, T_4 and T_5 respectively) in College of Veterinary and Animal Sciences, Bikaner (RAJUVAS). Animals were housed in well ventilated, hygienic and protected sheds and were allotted to acclimatize for a period of 10 days prior to experimental feeding. The animals were given prophylactic doses of panacure as anthelmintic. Faecal and blood smears were examined periodically for parasitic infestation. The animals in group T_1 (control) were fed 1.5 kg concentrate mixture (CP 20%), 2.5 kg groundnut straw and wheat straw *ad lib*. In group T_2, 75% of CP was met through concentrate mixture (1.125 kg) and rest through hydroponic maize fodder (2.63 kg) along with 2.5 kg groundnut straw and *ad lib*. wheat straw was given. Whereas, in group T_3, 50% of CP was met through concentrate mixture (0.75 kg) and rest through hydroponic maize fodder (5.27 kg) and 2.5 kg of groundnut straw was given along with *ad lib* wheat straw. In group T_4, 25% of CP was met through concentrate mixture (0.375 kg) and remaining by hydroponic maize fodder (7.9 kg) and 2.5 kg groundnut straw with *ad lib* wheat straw was offered. In T_5 group CP requirement was met through 10.54 kg hydroponic maize fodder and 2.5 kg groundnut straw along with wheat straw was given *ad lib*. Daily allowance of concentrate and roughage were offered to meet their nutrient requirements (ICAR, 1985) [10]. A feeding trial of 30 days was conducted.

Blood was collected from jugular vein with all aseptic precautions using 20 gauge needles to avoid rupture of corpuscles, damage of leucocytes and to allow flow of blood smoothly with a minimum of vaccum. For haematological examination disodium salt Ethylene-Diamine-Tetra Acetic Acid (EDTA) was used as an anticoagulant @ 1 mg/ml of blood. The blood, so drawn was collected in sterilized test tubes containing adequate amount of anticoagulant. For separation of serum, blood was collected in second tube, without anticoagulant and kept in second tube, without anticoagulant and kept in slanting position. These tubes were incubated for 1 h at 37 °C. Blood clots were broken and tubes were centrifuged at 2500 rpm for 30 minutes. The serum was pipette out in small Pyrex tubes and kept for further analysis of total serum protein and blood glucose, blood urea nitrogen and serum creatinine. Haemoglobin and PCV were estimated by Automatic Coult Counter. Blood serum parameters *viz*., total protein, serum ceratinine, blood urea nitrogen and blood glucose were estimated by Automatic Biochem Analyzer of Schiapparelli Biosystems, INC, using standard kits.

The data obtained in the experiment were analyzed using statistical procedures as suggested by Snedecor and Cochran (1994) [18]. Significance of mean differences was tested by Duncan's New Multiple Range Test (DNMRT) as modified by Kramer (1957) [13].

Results and Discussion

All the haemato-biochemical parameters *viz*., haemoglobin, packed cell volume, blood glucose, total serum protein, blood urea nitrogen showed non significant effect of feeding of hydroponics maize fodder in different treatment groups. Micera *et al.* (2009) [14] concluded that integration with hydroponically germinated oat in partial substitution of the complete feed does not modify biochemical and haematological parameters. Fayed (2011) [8] reported increase in albumin and urea levels and decrease in serum globulin and creatinine value in sprouted barley than untreated roughage. Helal and Hassan (2013) [9] reported significant increase in serum urea nitrogen, creatinine, total proteins, albumin, globulin, AST, cholesterol and potassium in goats fed with sprouted pruning leucaena trees compared with other treatments reflecting good immunity. Similarly, Verma *et al.* (2015) [19] reported that the blood parameters were similar and within normal range in all the treatment groups in Hariana male calves when hydroponics fodder was replaced with concentrate. No adverse affect on health of calves was observed.

Table 1: Average Values of Haemato-Biochemical Parameters in different treatment groups

	Treatment groups					
Parameter	**T_1**	**T_2**	**T_3**	**T_4**	**T_5**	**SEM**
Hb(g/dl)	11.17	11.19	11.18	11.24	11.2	0.00111
PCV %	31.17	31.19	31.2	31.22	31.22	0.000533
Blood glucose(mg/dl)	58.15	58.18	58.19	58.21	58.2	0.000358
Blood urea	27.49	27.53	27.56	27.75	27.64	0.00824
nitrogen (mg/dl)						
Total serum	7.73	7.75	7.79	7.81	7.8	0.00096
protein (g/dl)						
Serum creatinine	1.11	1.12	1.13	1.15	1.14	0.00011
(mg/dl)						

Conclusion

Feeding of hydroponics fodder have non significant effect on haemato bio chemical parameters but all were in normal range.

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