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Effect of Floor Type on Blood Biochemical Profile in Buffalo Heifers

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Abstract

An experiment was performed to access the comfort level with the help of blood biochemical profile in buffalo's heifers. Randomly eighteen healthy Murrah buffaloes of almost uniform in age, body weight and health status selected for experiment at Livestock Farm Complex (LFC), College of Veterinary Sciences & Animal Husbandry, DUVASU, Mathura up to three month duration. The selected animals were randomly divided into three groups viz. Concrete flooring (T1), Cow dung bed flooring (T2) and Rubber mat installed flooring. The study revealed that mean of total protein (mg/dl) in buffalo heifers were observed significantly (P>0.05) higher in T2 & T3 group (6.08 and 6.11) than T1 (5.45), while the total globulin (mg/dl) was significantly higher in T3 (2.60) than T1 & T2 (1.24 and 1.74) after 30 days of experimental period. The blood urea nitrogen (mg/dl), plasma creatinine (mg/dl), plasma glucose (mg/dl), plasma cholesterol (mg/dl) and plasma albumen (mg/dl) have on any significant changes during different phases of experimentation.

Keywords: Heifer; Plasma; Lameness.

Introduction

Blood biochemical profile and physiological responses of an individual is an important indicator of an individual's well being (Singh *et al.*, 2009). Any deviation from the normal state is certainly reflected through alteration in the blood constituents. Thus, the blood constituents serve as valuable tool to monitor health status of an individual (Singh *et al*. 2008). In this context, the present bulletin collates the haematological and biochemical profile of various breeds of cattle and buffalo under varied seasons and environmental conditions so as to generate a reference dataset of the indigenous breeds under native circumstances.

Animal comfort is of great importance, both from welfare & economic prospective. Adequate rest has been positively associated with productivity, health, and welfare of dairy cattle. A positive correlation between the amount of rest and growth rates has been reported for growing cattle (Mogensen *et al.*, 1997). The comfort depends on type and quality of bedding material, due to which the properties of floor construction in animal houses became of utmost importance. The bedding material must be durable & must not allow slipping. Flooring of livestock house ultimately decides the walking and lying comfort of the animals. Concrete and brick paved floor which are conventionally being used in feeding and loafing area, have been reported as far

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away from the ideal walking and standing surface for animals (Phillips and Morris, 2000). Cows prefer soft flooring for standing and walking such as soft, textured rubber compared to concrete and also stands in bedded cubicles to obtain relief from concrete passageways (Telezhenko *et al.*, 2005). Lameness is one of the most important welfare and productivity problems in the dairy industry. That it causes pain (Rushen *et al.*, 2007) and reduces both milk yield (Green *et al.*, 2002) and reproductive performance makes it extremely costly (Ettema and Ostergaard, 2006).

Now a days, farmers and farm owners use various floor types for animal shed such as concrete, bricks, gravels, mattresses, rubber mats, stones, compost etc. As diverse the floor types are in their properties, simultaneously they have different effects on the health and performance of animals. Presently being used concrete or hard flooring has been found detrimental to livestock health and production. Livestock markets then began producing different kinds of flooring mats and bedding materials, which, along with increased demand, claimed to be of utmost significance in cow growth and health. This gave rise to a wide demand for flooring materials in the livestock industry, which continues to flourish now in India as well.

Since, the heifer today is the future cow and the future milk production unit, its nutritional and management needs are thus more relevant despite having a tendency to pay little attention to them. The housing facility must provide comfortable place for animal to lie down. The blood biochemical profile is a tool to assess the comfort/stress level of any animal. Keeping these facts in mind the study was undertaken with the objective to study the effect of flooring on blood biochemical profile of buffalo heifers.

Material and Methods

The experiment was performed at Livestock Farm Complex of U.P. Pandit Deen Dayal Upadhayay Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go Anusandhan Sansthan, DUVASU, Mathura. The elevation (altitude) of Mathura is 174 meters (570 feet) above the mean sea level and lies between 27^0-14′ to 27^0-58′ N longitude and 77^0-71′ to 78^0-12′ E latitude (Singh, *et al.*, 2020). The average annual rainfall of the farm varies between 532-620 mm. The climate is generally characterized as hot & dry during summers. The maximum temperature varies between 45-48^0 C during summer and the minimum temperature dips up to 2^0C during winters. The relative humidity of the farm varies from 18 to 79 percent. The study place falls under semi-arid region of the country. With the approval of Institutional Animal Ethics Committee of College of Veterinary Sciences and Animal Husbandry, DUVASU, Mathura experiment was conducted during the months of November 2019 to February 2020 to achieve the goal. The animals (murrah buffalo heifers) maintained at Livestock Farm Complex (LFC), College of Veterinary Sciences and Animal Husbandry, DUVASU, Mathura, were selected as experimental animals for present investigation. A total of 18 healthy buffalo heifers were selected and randomly divided into three groups, containing six animals in each group Treatment 1 (T1): Concrete flooring (Conventional method practiced at LFC), Treatment 2 (T2): Compost/cow dung bed flooring and Treatment 3 (T3): Rubber mat installed flooring. The data were analyzed as per standard procedure prescribed by Snedecor & Cochran (1989) and Duncan (1955).

Result and Discussion

The plasma blood urea nitrogen concentration (mg/dl) values ranged from 16.44 to 17.10 mg/dl in T1 (Control), 15.95 to 16.15 mg/dl in T2 and 16.35 to 16.82 mg/dl in T3 treatment groups. The pooled mean value of blood urea nitrogen concentration was found to have no significant difference (P>0.05) between the groups. The plasma creatinine concentration (mg/dl) values ranged from 1.23 to 1.29 mg/dl in T1 (Control), 1.08 to 1.27 mg/dl in T2 and 1.06 to 1.25 mg/dl in T3 treatment groups. Similarly, the pooled mean value of plasma creatinine, glucose. Cholesterol concentration was non significant difference (P>0.05) between the treatments.

Table 1: Effect of floor type on blood biochemical profile (mg/dl) in buffalo heifers

Parameters	Days	Treatment			SEM	P value
		T1	T2	T3		
Blood Urea Nitrogen (mg/dl	0	16.51	16.11	16.78		
	30	16.95	16.09	16.82	0.35	0.34
	60	16.44	15.95	16.35	0.33	0.78
	90	17.10	16.15	16.73	0.42	0.54
	Mean	16.75	16.07	16.67	0.37	0.58

Table cont....

	0	1.24	1.27	1.25	0.09	0.95
	30	1.29	1.22	1.12	0.11	0.77
Creatinine (mg/dl)	60	1.28	1.09	1.11	0.06	0.28
	90	1.23	1.08	1.06	0.07	0.51
	Mean	1.26	1.16	1.13	0.08	0.62
	0	47.82	51.92	52.20	1.32	0.08
	30	48.95	48.30	51.83	1.41	0.26
Blood glucose (mg/dl)	60	48.57	53.73	50.06	1.55	0.15
	90	52.21	52.07	52.00	1.17	0.57
	Mean	49.39	51.49	51.52	0.70	0.09
	0	95.71	83.18	84.45	2.93	0.16
	30	109.74	105.33	137.26	9.43	0.34
Cholesterol (mg/dl)	60	103.69	111.96	131.04	7.26	0.30
	90	107.64	118.39	101.07	6.15	0.53
	Mean	104.19	104.71	113.45	3.63	0.51
	0	6.55	6.84	6.65	0.20	0.86
	30	4.74a	5.30a	6.30b	0.20	0.00
Protein (mg/dl)	60	5.15a	6.09b	5.51a	0.12	0.00
	90	5.26	6.10	5.96	0.22	0.38
	Mean	5.45a	6.08b	6.11b	0.11	0.02
	0	3.48	3.53	3.46	0.07	0.933
	30	3.50	3.55	3.70	0.05	0.394
Albumin (mg/dl)	60	3.73	3.50	3.79	0.05	0.092
	90	3.64	3.47	3.62	0.05	0.348
	Mean	3.59	3.51	3.64	0.03	0.243
	0	3.06	3.30	3.18	0.21	0.91
	30	1.24a	1.74a	2.60b	0.20	0.01
Globulin (mg/dl)	60	1.52a	2.59b	1.72a	0.15	0.00
	90	1.72	2.63	2.33	0.24	0.31
	Mean	1.88	2.57	2.46	0.11	0.06

Means bearing the different superscript with in a row differ significantly

The total plasma protein concentration (mg/dl) values ranged from 4.74 to 6.55 mg/dl in T1 (Control), 5.30 to 6.84 mg/dl in T2 and 5.51 to 6.65 mg/dl in T3 treatment groups. The values of protein were found significantly higher in T3 at day 30 compared to T1 and T2. Also, at day 60 it was found significantly higher in T2 compared to T1 and T3. The pooled mean values of total plasma protein concentration were found to be significantly (P>0.05) higher in T2 and T3 compared to control group.

The total plasma albumin concentration (mg/dl) values ranged from 3.48 to 3.73 mg/dl in T1 (Control), 3.47 to 3.55 mg/dl in T2 and 3.46 to 3.79 mg/dl in T3 treatment groups. The total plasma albumin concentration (g/dl) at monthly intervals were found to have no significant difference (P>0.05) between groups.

The total plasma globulin concentration (mg/dl) values ranged from 1.24 to 3.06 mg/dl in T1 (Control), 1.74 to 3.30 mg/dl in T2 and 1.72 to 3.18 mg/dl in T3 treatment groups. The overall mean value of total plasma globulin concentration was non significantly different (P>0.05) between treatment groups. However at day 30 total plasma globulin concentration was significantly higher in T3 compared to T1 and T2 and significantly higher in T2 compared to T1 and T3 at day 60.

The results revealed that the floor type had no significant effect on the plasma concentration of blood urea nitrogen, creatinine, glucose, cholesterol and total albumin. All these parameters showed the values within the normal physiological range suggesting that floor types used do not have any adverse effect on the murrah buffalo heifers. These results are in line with the findings of Peter et al

(2006),

The analysis of the results for plasma total protein revealed significantly higher values in T3 at day 30 compare to T1 and T2; at day 60 it was found significantly higher in T2 compared to T1 and T3. The pooled mean value of total plasma protein concentration were found to be significantly ($P<0.05$) higher in T2 and T3 compared to control group. The overall mean value of total plasma globulin concentration was non-significantly different ($P>0.05$) between treatment groups. However at day 30 total plasma globulin concentration was significantly higher in T3 compared to T1 and T2 and significantly higher in T2 compared to T1 and T3 at day 60. Similarly findings were also observed by Chikwanda *et al.* (2017) in Nguni goats.

Conclusion

Comfortable and clean housing system with adequate flooring is essential for proper rest, sleep and to exhibit normal behaviours of animals. Adequate rest and sleep is essential for the welfare of growing animals. On the basis of experimentation It may be concluded that there is no any adverse effect on health of Murrah buffaloe heifers reared under three different types of flooring.

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