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Contact Details:

Institute for Development of Technology for Rural Advancement

Vrindavan, Mathura-281121 INDIA

Email: chiefeditor@idtra.co.in

editor@idtra.co.in

Website: jra.idtra.co.in

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Thermal effect on general and excretion behaviour of White New Zealand rabbit kept on moringa (*Moringa oleifera*) pod meal

Awadhesh Kishore and Kesete Goitom*

School of Agriculture
ITM University, Gwalior (M.P.), India

*Department of Animal Sciences
Hamelmalo Agricultural College, Keren, Eritrea

Abstract

The objective of the experiment was to study the general, sleeping, and excretion behahaviour as affected by the various environmental temperatures. The field trial was conducted at Hamelmalo Agricultural College (HAC), Eritrea (semi-arid climate) during April and May 2018. Twelve non-lactating female White New Zealand Rabbits were randomly divided into six pairs based on their body weight. One animal from each pair was allotted to control (3.25±0.20 kg) and test groups (3.20±0.18 kg). They were housed in separate cages under the indoor cage system. Concentrates made of HAC cafeteria leftovers were given to the control whereas, in the test group, 15% of it was replaced with the moringa (Moringa oleifera) pod meal on a fresh basis. The animals had free access to green fodder and drinking water and 3 g of common salt. An eight-day adaptation period was followed by a behaviour experiment conducted to study their general, specific nutritional, excretion, and urination behaviour for consecutive 120 hours dived into 24 slots of 5 hours each. The animals were observed at an interval of 15 minutes to fill up behaviour inventory including various aspects related to general, specific, nutritional, excretion, and urination behaviour. The same ambient temperature was recorded. For comparing two feeds 'paired t-test for the difference in means was used. It can be concluded based on the findings of this part of the research project that the thermal effect is one of the important factors which affects the behaviour of the rabbit. The rabbits were found most active at the time when the environmental temperature was low (minimum of 16.9°C during the experiment). So, a feeding strategy may be suggested to schedule the feeding hours of the rabbits during the period when the environmental temperature is low (16.9°C).

Keywords: Behaviour, Environmental temperate, Excretion, Moringa, Resting, Sitting, Sleeping, Standing, Urination, White New Zealand rabbit,

Introduction

The behaviour of the animals is an indicator to examine the health and adaptation of the animals since the beginning of the husbandry of animals. Dawkins (2003) reported the animal welfare issue can be approached by the questions related to the physically healthy and the basic requirements and the behaviour of the animals give the correct answers to the questions. Showing appropriate behaviour in different situations shows that the animals are kept in optimum conditions and

were fit for production. The rabbit is light and thermal-sensitive animal. This is the reason any change in environmental temperature is immediately reflected in the behaviour of a healthy rabbit. The environmental temperature range between 16–21˚C showed a better physiological response in the rabbits (Verg et al 2007). This along with the light intensity made the animal nocturnal and they maintain these factors maintained naturally. The behaviour study, therefore, attracts the attention of the research worker to understand more about how the rearing system and season can influence the behaviour, production, and carcass traits of rabbits (El-Sabrout 2018). Along with the other factors, the environmental temperature is also an important factor to affect the productivity of the rabbits. The doe that was capable to produce 10 liters a year may give only 4 to 5 liters in a hot climate (Marai and Rashwan 2004).

The influence of feed nutritional composition on the feeding behaviour of rabbits is poorly understood. Reports are available to show that the nutritional requirements of the animals are varying because of the ambient temperature (Gidenne et al 2010). The rabbit's energy outflow depends on ambient temperature. Feed intake to manage energy needs is therefore it is directly linked to the environmental temperature. The amount eaten at each meal drops and water intake increases with high temperatures (10°C to 30°C). The negative effect of hot ambient temperatures (29-32°C) on daily feed intake could be partly counterbalanced by the distribution of drinking water refreshed at 16-20°C.

The general behaviour of rabbits especially sitting, standing resting, and sleeping behaviour are still to be understood. The information on the time spent on eating is also scanty. The excretion behaviour has also received less attention from the research workers. The present investigation is therefore planned to study the general, sleeping, and excretion behahaviour behaviour as affected by the various environmental temperatures.

Materials and Methods

The field trial was conducted at Rabbit Farm, Hamelmalo Agricultural College (HAC), Hamelmalo, Keren, Zoba Anseba (1286 m above sea level) during April and May 2018. The location has a semi-arid climate with an annual mean rainfall of 440 mm and an average annual temperature of 24^0C. The experiment was conducted.

Twelve non-lactating female White New Zealand Rabbits were randomly selected and divided into six pairs based on their body weight. One animal from each pair was allotted to one of the two groups, viz. control (3.25±0.20 kg) and test group (3.20±0.18 kg). The experimental animals were housed in separate cages under the indoor cage system. They were not allowed any routine exercise.

Concentrates made of HAC cafeteria left-overs were given to the experimental animals to meet their daily DCP and ME requirements (Cheeke, 1987; Maertens, 1992) in the control group whereas, in the test group, 15% of the concentrate was replaced with the moringa (Moringa oleifera) pod meal on a fresh basis. All the animals had free access to green fodder and fresh and clean water and also received 3 g of common salt with the concentrate.

During the experiment, an eight-day adaptation period was followed by a five-day behaviour experiment. The animals were also observed for their general, specific nutritional, excretion, and urination behaviour. The behaviour experiment continued for consecutive 120 hours and dived into 24 slots of 5 hours each. The animals were offered weighed amount of feed at the start of the slot. At the same time, feed samples were collected. The refusals of feed and faeces were weighed and sampled at the end of the slot. The samples

were preserved for proximate analysis (AOAC, 2000). Gross energy was estimated by using the formula given by Kearl, (1982). During each slot, the animals were observed at an interval of 15 minutes to fill up the behaviour inventory (Kishore, 1998) including various aspects related to general, specific, nutritional, excretion, and urination behaviour. The same ambient temperature was recorded.

For comparing two feeds 'paired t-test for the difference in means (Snedecor and Cochran, 1994) was used. For comparing the behaviour of animals two-way ANOVA with a replication technique was implemented. The data were statistically analyzed using a data analysis pack of MS Office excel 2007 (MS Office, 2006).

Results and Discussion

The thermal effect has been recorded as an important factor that had a significant impact on the general behaviour of the rabbits (Table 1). As the environmental temperature increased, animals spent more time in sitting posture and less in standing ($P<0.01$). The highest standing and lowest sitting time were recorded at the peak of the environmental temperature and vice versa. The change in the general behaviour of the rabbit because of the thermal effect was measured up to 35 (54.68-89.84) and 37 (54.97-91.87) sitting times and 35 (10.16-45.32) and 37 (8.13-45.03) per cent standing time in control and test groups, respectively. However the behaviour of the rabbits in the two groups remained non-significant because of the changing environmental temperature, but the thermal effect on the general behaviour of the experimental animals was similar. The results were indicating that animals were most active if the environmental temperature was lowest and less if it was high. The findings could not be confirmed because of scanty literature.

The environmental temperature played a vital role in changing specific behaviour of rabbits including resting, sleeping, and ingestion behaviours (table 16-18; Fig. 2). With the increase in environmental temperature, the sleeping times of the experimental rabbits increased significantly whereas resting and ingestion times were decreased. The change in time used for resting, sleeping, and ingestion were 26 (41.06-66.96%) and 34 (36.99-69.88), 36 (52.85-16.08), and 44 (13.16-57.32) and 11 11 (6.10-16.96) and (5.69-16.96) per cent in control and test groups, respectively because of change in environmental temperature. The findings for the two diets were non-significantly different in this respect and the environmental temperature was influencing the specific behaviour of the rabbits in the same way ($P>0.01$). The results were indicating that the animals preferred to be involved in standing and related activities (eating) at low environmental temperatures and sitting and related activities (sleeping) when it was high. Present findings were in line with Lebas *et al.,* (1997) who reported that closer analysis of feeding behaviour showed that as the temperature rises the number of solid and liquid meals eaten in 24 hours drops.

The thermal effect had been recorded to influence the excretion behaviour of the rabbits (Table 2). The frequency of faecal excretion was highest at an environmental temperature between 20-30°C in both the groups viz. control and test. An increase or decrease in environmental temperature from this range was the reason for decreased frequency of faecal excretion. It was pointed out that changes in this respect were up to 0.34 (0.12-0.46) and 0.30 (0.02-0.32) per hour in the control and test groups, respectively. As far as the two diets were concerned, the excretion behaviour was significantly different but it followed the same trend in both groups. The findings could not be confirmed because of scanty literature.

Table 1: Thermal effect on general behaviour (time used%)

Environmental Temperature (˚C)	Control	Test	*P-Value*
Sitting			
15-20	54.68±3.88	54.97±4.24	
20-25	55.71±2.93	58.83±3.81	
25-30	68.30±2.26	71.73±3.80	*0.00*
30-35	87.38±2.20	91.67±1.00	
35-40	89.84±1.16	91.87±1.50	
P-Value	*0.16*		
Standing			
15-20	45.32±3.88	45.03±4.24	
20-25	44.29±2.93	41.27±3.81	
25-30	31.70±2.26	28.27±3.80	*0.00*
30-35	12.62±2.20	8.33±1.00	
35-40	10.16±1.16	8.13±1.50	
P-Value	*0.16*		
Sleeping			
15-20	16.08±1.39	13.16±3.23	
20-25	14.13±1.71	14.92±1.63	
25-30	22.71±1.95	22.71±4.15	*0.00*
30-35	52.86±1.48	48.81±4.24	
35-40	52.85±3.25	57.32±5.52	
P-Value	*0.87*		
Resting			
15-20	66.96±2.00	69.88±2.98	
20-25	69.84±1.80	65.63±1.40	
25-30	61.44±1.94	60.29±3.59	*0.00*
30-35	42.46±1.69	45.00±4.14	
35-40	41.06±2.98	36.99±5.17	
P-Value	*0.65*		
Eating			
15-20	16.96±2.78	16.96±2.34	
20-25	16.03±0.90	19.44±1.20	
25-30	15.85±1.53	16.99±1.55	*0.00*
30-35	4.29±0.90	6.19±0.88	
35-40	6.10±1.51	5.69±0.81	
P-Value	*0.23*		

There was a vital thermal effect on the urination behaviour of the experimental animals during the experiment. The frequency of urination was decreased when the environmental temperature was increased. In two groups, control, and test, the urination behaviour was non-significant. Due to changes in the temperature, the frequencies of urination were changed up to 0.34 (0.16-0.50) and 0.13 (0.20-0.33) per hour in both groups. However, the trend in this respect, in both the groups remained similar. The results were indicating that the animals were urinating with higher frequencies during low environmental temperatures and vice versa. The findings could not be confirmed because of scanty literature.

Table 2 Thermal effect on excretion behaviour of White New Zealand rabbits

Environmental Temperature (˚C)	Control	Test	*P-Value*
Faecal Excretion (Frequency per hour)			
15-20	0.69±0.06	0.22±0.09	
20-25	0.46±0.06	0.31±0.04	
25-30	0.35±0.06	0.32±0.07	*0.00*
30-35	0.13±0.04	0.09±0.00	
35-40	0.12±0.06	0.02±0.00	
P-Value	*0.00*		
Urine Excretion (Frequency per hour)			
15-20	0.50±0.08	0.33±0.06	
20-25	0.41±0.06	0.32±0.06	
25-30	0.16±0.04	0.26±0.00	*0.00*
30-35	0.27±0.07	0.11±0.04	
35-40	0.16±0.09	0.20±0.07	
P-Value	*0.17*		

Conclusion

It can be concluded based on the findings of this part of the research project that the thermal effect is one of the important factors which affects the behaviour of the rabbit. The rabbits were found most active at the time when the environmental temperature was low (minimum of 16.9°C during the experiment). So, a feeding strategy may be suggested to schedule the feeding hours of the rabbits during the period when the environmental temperature is low (16.9°C).

References

AOAC. 2000. Official methods of analysis. 17th edn, Association of Official Analytical Chemists.

Cheeke P R. 1987. Rabbit Feeding and Nutrition. Academic Press, Washington D.C.

Dawkins M S. 2003. Behaviour as a tool in the assessment of animal welfare. Zoology. 106(4): 383-387.

El-Sabrout K. 2018. Effect of rearing system and season on behaviour, productive performance and carcass quality of rabbit: A review. Anim. Behav. Biometeorol. 6(4): 102-108.

Gidenne T, Lebas F and Fortun-Lamothe L. 2010. Feeding behaviour of rabbits. CABI Digital Library, pp. 233-252.

Kearl L C. 1982. Nutrient requirements of ruminants in developing countries. International Feedstuffs Institute, Utah Agricultural Experimental Station, Utah State University, Logan, Utah, 381p.

Kishore A. 1998. Manipulation of rumen fermentation using buffers in crossbred cattle. Annual Report 1997-98, RBS College, Agra. 94p.

Lebas F, Coudert P, de Rochambeau H and Thebault R G. 1997. THE RABBIT: Husbandry, health and production. Food and Agriculture Organization of the United Nations, Rome.

Maertens L. 1992. Rabbit nutrition and feeding: A review of some recent developments. Journal of Applied Rabbit Research 15: 889-890.

Marai I F M and Rashwan A A. 2004. Rabbits behavioural response to climatic and managerial conditions – a review, Arch. Anim. Breed. 47: 469–482.

MS Office. 2006. Microsoft office 2007: Microsoft Excel. Microsoft Inc., New York.

Snedecor G W and Cochran W G. 1994. Statistical Methods, 8th Ed., Iowa State University Press, Ames.

Verg M, Luzi F and Carenzi C. 2007. Effects of husbandry and management systems on physiology and behaviour of farmed and laboratory rabbits. Hormones and Behavior. 52(1): 122-129.

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Impact of manipulated rumen fermentation using buffers on the behavior of cross-bred calves

Awadhesh Kishore and Prakash Chandra*

School of Agriculture
ITM University, Gwalior M.P. (India)

*Department of Animal Husbandry and Dairying
Raja Balwant Singh College, Bichpuri-283105, Agra (India)

Abstract

Twelve cross-bred calves (131-221d; 57.5-93.9kg) were divided into three groups. One animal from each group was randomly allotted to one of the four treatments viz. T_1, T_2, T_3, and T_4. The animals were given grass mixture and wheat straw. The concentrate mixture contained barley grain and mustard cake. The amount of each feed ingredient for each animal was calculated based on the NRC feeding standard. Apart from this, each animal also received 20g of common salt and 25g of mineral mixture. Buffer in the form of sodium bicarbonate and magnesium oxide in combination at the rate of 0.00 and 0.00, 0.20 and 0.10, 0.40 and 0.20 and 0.60 and 0.30 per cent of LW were given in T_1, T_2, T_3, and T_4 respectively. During the excretion behavioral trial frequency of urine and fecal excretion during the whole day was divided into four quarters viz. 0.00-6.00 hours (Q_1), 6.00-12.00 hours (Q_2), 12.00-18.00 hours (Q_3), and 18.00-0.00 hours (Q_4) were recorded. During the trial animal intakes, ruminates, or rests in each quarter of the day were recorded after 15 minutes. Statistical analysis was done using factorial RBD. Results of this study focused that the frequency of fecal excretion reduced and urine excretion increased, the standing period became longer, rumination cycle and mastication decreased due to the addition of buffer in the diet. The rumination cycle was completed in a short period and the number of mastication involved in one rumination cycle was less in the last quarter. The time used to chew one bolus was longer in Q_2 and Q_3. Time taken per mastication was shorter in the afternoon session (Q_3). The overall conclusion can be made that the addition of buffer in ruminant nutrition (buffer feed technology) was responsible to reduce rumination in calves.

Keywords: Behaviour, Buffers, Cross-bred calves, Magnesium oxide, Rumination, Sodium bicarbonate.

Introduction

Ingestion behavior, through both diet selection and food ingestion, is a major way that an animal attempts to fulfill its metabolic requirements and achieve homeostasis. In domestic herbivores across a wide range of production practices, voluntary feed intake is arguably the most important factor in animal production, and a better understanding of systems involved in intake regulation can have important practical implications in terms of performance, health, and welfare (Ginane et al 2015). The feeding behavior of animals reflects the current motivation consequence of the integration of an individual, over time of many factors including sensorial,

metabolic, and physiological signals. Animals may resolve the challenge of obtaining adequate nutrients in different ways from each other which may partly be due to different set-points in regulatory pathways (Provenza et al 2003). Other factors influencing the feeding behavior of ruminants include grazing management practices, type of vegetation and season, breed and stage of production, group size, and properties of diets fed in confinement (Goetsch et al 2010).

Improving the monitoring of rumination in cattle could help in assessing the welfare status and their risk of acidosis and other physical disorders. This method is very much easy, quick, and accurate to find out abnormalities in the physical state of the animals. Accurate monitoring of the rumination behavior of cattle using IMU signals from a mobile device. Rumination represents 5 to 9h/d for cattle (Vallentine 2001). It is a cyclic process that completes the chewing of fibrous ingested feed after it underwent anaerobic fermentation by microbes in the rumen. A cycle begins with the regurgitation of a rumino-reticular bolus followed by semi-circular jaw movements and ends with the deglutition (Jarrige et al 1995).

Buffer feed technology reveals to add buffers in animal nutrition with the object to keep pH constant in rumen fluid. The use of sodium bicarbonate and magnesium oxide in combination showed better potential in terms of milk yield (Elckelberger et al 1985), the yield of milk constituents (Singh et al 1998), average daily gain (Kishore et al 1998), chevon quality (Chandra et al 1997) and biodiversification of different nutrients from feed to milk (Kishore et al 1997).

But before offering the buffer directly to the cow a thorough study on calves was needed to fix up the suitable level of the buffer. This investigation was, therefore, planned as an effort to study the effect of manipulation of rumen fermentation using buffers in cross-bred calves on their behavior viz. consumption of feed, rumination, excretion, and their general behavior.

Materials and methods

Twelve cross-bred calves (age 131-221d; LW 57.5-93.9kg; heart girth 91-105cm; body length 75-92cm; height 78-93; collar length 52-71; tail length 42-57cm) were selected from the herd of college Dairy Farm and de-wormed. They were housed in a calf shed having separate feeding mangers and water troughs for individual feeding and large sized open enclosure for exercise. Those were given grass mixture and wheat straw. The concentrate mixture contained barley grain and mustard cake (Table-1). The amount of each feed ingredient for each animal was calculated based on the NRC feeding standard along with 20g common salt and 25g mineral mixture.

Based on age and weight the animals were divided into three groups. One animal from each group was randomly allotted to one of the four treatments viz. T_1, T_2, T_3, and T_4. Buffer in the form of sodium bicarbonate and magnesium oxide in combination at the rate of 0.00 and 0.00, 0.20 and 0.10, 0.40 and 0.20 and 0.60 and 0.30 per cent of LW were given in T_1, T_2, T_3, and T_4, respectively.

During the excretion behavior trial, (after 35 days of the experiment, for four consecutive days) frequency of urine and fecal excretion during the whole day was divided into 4 quarters vi. 0:00-6:00 (Q_1), 6:00-12:00 (Q_2), 12:00-18:00 (Q_3) and 18:00-0:00 hours (Q_4) were recorded. Excreted urine and feces were also collected and weighed individually after each quarter. During the rumination behavior trial (after 40 days of the experiment, for 4 consecutive days) animals were studied at the time when they were in ruminating condition strictly for 20 rumination cycles in each quarter of the day.

Table 1: Chemical composition of feeds (%DM)

Parameter	Straw	Grass	Barley grain	Mustard cake	Buffer
DM*	91.20	28.20	90.30	88.20	100.00
TA	10.00	10.00	9.30	7.50	100.00
OM	90.00	80.40	90.70	92.50	0.00
CP	3.10	6.90	10.20	35.00	0.00
EE	1.00	1.80	2.60	2.00	0.00
TCHO	85.90	80.90	77.90	55.50	0.00
GE**	3.98	4.06	4.20	4.62	0.00
CF	35.20	44.60	10.10	7.90	0.00
NFE	50.70	36.10	67.80	47.60	0.00
Calcium	0.10	0.40	0.20	0.20	0.00
Phosphorus	0.10	0.20	0.20	0.20	0.00
Sodium	0.20	0.60	0.40	0.40	18.00
Magnesium	0.10	0.30	0.30	0.40	19.50
Potassium	5.80	0.90	0.50	1.20	0.00
NDF	74.20	71.10	56.80	53.50	0.00
ADF	51.10	38.20	42.00	43.90	0.00
Hemicellulose	23.10	32.90	14.80	9.60	0.00
Cellulose	43.00	31.90	37.00	33.00	0.00
Lignin	2.80	2.70	2.30	2.00	0.00
Cell content	25.80	28.90	43.20	46.50	0.00

* Fresh basis ** Mcal/kg DM

During the period of total time in one rumination cycle, time used for mastication, pause between two cycles, and the number of mastication per cycle were noted in both the conditions either sitting or standing separately. During the feeding and general behavior trial (after 50 days of the experiment, for 4 consecutive days) animals were kept under observation (after 15 m intervals) to study their sitting and standing behavior. Those were also observed for eating, ruminating, or resting activities. Observed data were subjected to statistical analysis using standard procedures (Snedecor and Cochran 1994).

Results and Discussion

It has been observed that after 48 to 72 hours of the first buffer regime, the animals suffered from bloat followed by diarrhea for one day which was cured automatically. Diarrhea was frequent in the treatment in which buffer was offered at the highest level, the animals could complete just an adaptation period on the 21st and the 22nd day died because of severe diarrhea followed by acute bloat and sudden death. Animals in T_3 also showed similar symptoms and died within the 8th and 9th weeks of the experiment. Severe diarrhea followed by acute bloat had been recorded by Kishore (1997) with kids and lactating goats because of including buffers in the diet.

The DMI remained unaffected because of the addition of buffers in the diet (Table 2) but digestible nutrients of DM, CP, and DE increased with the increased level of buffers regime. These results could be registered because of the increased digestibility

coefficients of the respective nutrients. A similar pattern of intake of these nutrients is reviewed in the literature (Hemminger and Krichgassner 1972, Toro et al 1982, Johnson et al 1988, Solorzano et al 1989, Kishore et al 1996, Kishore 1997, Kishore et al 1998). The reason could be that the addition of buffers increases liquid turnover rate, solid retention time (Stocks 1983), rate of dilution of ruminal fluid, and out flow rate of duodenal passage of digesta (Dewhurst and Webster, 1992). Water intake was observed to be related directly proportional to the level of buffers inclusion in the diet. The reason for the same could be the addition of sodium ions as observed by Fattman et al (1981), Stocks (1983), Rogers et al (1985), Johnson et al (1988), Kishore et al (1996), Kishore (1997) and Kishore et al (1998) with sodium carbonate and Fettman et al (1984) with sodium chloride regime.

Table 2: Voluntary intake

Nutrient	Unit	T_1	T_2	T_3	CD at 5%
DM	g per $kgW^{0.75}$	78.1±0.9	84.3±4.6	85.1±1.5	11.20
	kg per 100 kgLW	2.59±0.07	2.69±0.08	2.73±0.08	0.39
DDM	g per $kgW^{0.75}$	$42.8±0.7^{(B)}$	$49.4±3.4^{(A)(B)}$	$521.±1.5^{(A)}$	7.90
	kg per 100 kgLW	1.42±0.03	1.57±0.04	1.67±0.05	0.21
CP	g per $kgW^{0.75}$	$4.6±0.4^{(B)}$	$6.9±0.4^{(A)}$	$7.6±0.4^{(A)}$	1.70
	g per 100 kgLW	$153.2±12.2^{(B)}$	$231.2±15.3^{(A)}$	$244.9±17.1^{(A)}$	62.90
DCP	g per $kgW^{0.75}$	$2.7±0.2^{(B)}$	$4.1±0.2^{(A)}$	$4.9±0.2^{(A)}$	1.10
	g per 100 kgLW	$88.7±7.7^{(B)}$	$138.8±8.4^{(A)}$	$155.7±8.9^{(A)}$	38.00
DE	kcal per $kgW^{0.75}$	$182.5±1.5^{(B)}$	$194.4±6.6^{(A)(B)}$	$208.4±8.4^{(A)}$	16.90
	meal per 100 kW	$6.05±0.13^{(B)}$	$6.45±0.15^{(A)}$	$6.65±0.08^{(A)}$	0.35

$^{(A)(B)}$-Values bearing different superscripts among the row differed significantly i.e. $p<0.05$.

The frequency of excretion was decreased but urine excretion increased (Table 3) due to the buffers regime. Decreased frequency of fecal excretion could be increased DM digestibility (Hemminger and Krichgassner 1972, Toro et al 1982, Johnson et al 1988, Solorzano et al 1989, Kishore et al 1996, Kishore 1997, Kishore et al 1998). Increased frequency of urine excretion may be due to increased water intake (Fattman et al 1981, Stocks 1983, Rogers et al 1985, Johnson et al 1988, Kishore et al 1996, Kishore 1997, Kishore et al 1998) with sodium carbonate. The eating period remained unaffected but the standing period was increased and the sitting period was decreased in the animals because of the administration of buffers in the diet. There was no evidence in the literature for comparison of such findings. Increased intake of digestible energy could be a possible reason to increase standing and decreased sitting periods. The unaffected eating period could be due to non-significant DM intake in the animals fed on the diet without and with buffers (Table 2). The rumination period and the number of ruminations and mastication per day were reduced because of the buffers regime. The reason could be that pH of ruminal fluid which is regulating factor of rumination was less fluctuating because of the presence of buffer. Yang and Beauchemin, (2006) suggested that dietary NDF and fermentable OM intake are critical in regulating rumen pH, Increased NDFD is increased because of the addition of buffers in the diet (Kishore 1997). Dietary particle

size, expressed as per NDF, was a reliable indication of chewing activity. Resting period during which the animals neither took food nor ruminated increased because of the introduction of the treatments which was due to the interactive effect of DMI and buffering action in the rumen environment.

Table 3: Animal behaviour

Parameters	Treatment			
	I	II	III	CD
Frequency of fecal excretion (n/d)	16.17±0.36$^{(A)}$	12.33±0.36$^{(B)}$	13.00±0.41$^{(B)}$	0.80**
Frequency of urine excretion (n/d)	12.00±0.85$^{(B)}$	14.33±0.36$^{(A)}$	15.33±0.36$^{(A)}$	2.28*
Standing period (m/d)	923.33±10.63$^{(B)}$	886.67±4.91$^{(B)}$	1038.33±46.21$^{(A)}$	102.76*
Sitting period (m/d)	516.67±10.63$^{(A)}$	553.33±4.91$^{(A)}$	401.67±46.21$^{(B)}$	102.76*
Eating period (m/d)	405.00±18.17	426.67±42.97	448.33±52.30	48.42*
Rumination period(m/d)	501.67±18.91$^{(A)}$	300.00±12.47$^{(B)}$	321.67±51.69$^{(B)}$	78.00**
Resting period (m/d)	630.00±12.47$^{(B)}$	713.33±32.52$^{(A)}$	670.00±37.93$^{(A,B)}$	93.00*
No rumination cycle(n/d)	549.83±56.34$^{(A)}$	300.63±10.70$^{(B)}$	299.12.76$^{(B)}$	87.86**
No mastication (n/d)	26597±909$^{(A)}$	14131±691$^{(B)}$	15209±999$^{(B)}$	4008**
Rumination cycle in standing (s)	45.88±1.84$^{(B)}$	59.53±2.15$^{(A)}$	64.02±2.11$^{(A)}$	4.81**
Rumination cycle in sitting (s)	50.50±2.38$^{(B)}$	63.53±1.73$^{(A)}$	67.03±1.70$^{(A)}$	6.67**
No mastication in one cycle in standing (n)	40.20±1.60$^{(B)}$	43.86±1.76$^{(B)}$	49.18±2.08$^{(A)}$	4.00**
No. Mastication in one cycle in sitting (n)	45.95±2.21$^{(B)}$	51.65±1.84$^{(A)}$	53.85±2.00$^{(A)}$	5.54*
Time per bolus in standing (s)	42.38±2.08$^{(C)}$	55.04±2.15$^{(B)}$	60.18±2.02$^{(A)}$	4.77**
Time per bolus in sitting (s)	46.80±2.44$^{(B)}$	59.58±1.72$^{(A)}$	62.28±1.65$^{(A)}$	6.65**
Time per mastication in standing (s)	1.05±0.02$^{(B)}$	1.27±0.01$^{(A)}$	1.23±0.04$^{(A)}$	0.07**
Time per mastication in sitting (s)	1.02±0.01$^{(B)}$	1.17±0.02$^{(A)}$	1.17±0.02$^{(A)}$	0.09**
Pause per cycle in standing (s)	4.16±0.13	4.49±0.11	4.10±0.23	0.55*
Pause per cycle in sitting (s)	3.70±0.11$^{(B)}$	3.95±0.11$^{(B)}$	4.75±0.18$^{(A)}$	0.55**

Photoperiodic effect on animal behavior

Findings during the rumination behavior study trial resulted in the time taken to complete one rumination cycle, the number of mastication per cycle, time used to masticate one bolus, pause between two rumination cycles, and time per mastication were increased in both of the positions i.e. sitting and standing, due to inclusion of buffers in animal feed. The literature is almost scanty on this line to compare the observations.

During four quarters of the day frequency of fecal excretion (Table 4) was lower in the early morning hours (Q_1) because during this period the animals used more time for taking rest or sleeping. The frequency of urine excretion was not affected because of the photo-periodic effect. The animals were in sitting positions during the early morning session and standing positions in the morning session, the reason could be again that during Q_1 they were using more time for taking rest or sleeping whereas in Q_2 they were using more time for taking food and exercise. Time used for taking food during late night hours (Q_4) was lowest whereas the time for rumination in night hours (Q_1 & Q_4), was highest. This is a well-known fact that the regulating factor of rumination is the pH of rumen content i.e. reduced pH increases rumination. Increased rumination in the night hours was due to the pH of rumen liquor being decreased after 12 hrs of feeding due to continued fermentation and thus increased rumination. The resting period was lowest in the morning hours (Q_1). The literature on this line is quite scanty and as such the findings could not be compared.

The number of rumination cycles and mastication was recorded to be lowest in the early morning hour which could be because of the reason that the animals were busy taking food or exercise. During this period they used very less time for rumination because of the increased time interval after feeding which may be due to the fall in pH during this period due to the fermentation of feed (Kishore et al 1996). The length of rumination cycles in both the positions i.e. standing and sitting were shortest in the last half of the day (Q_3 & Q_4). No clear-cut trend could be observed in terms of the number of mastication per rumination in two positions. Time is taken to masticate one bolus was prolonged in the last two quarters of the day (Q_3 & Q_4) in both positions. During the standing position, time per mastication was shortened during evening hours (Q_3) whereas it remained similar round the day in the sitting position. The pauses between two rumination cycles in both positions were not affected because of the impact of photoperiodism. The findings could not be compared with the literature due to want of information in this respect.

Conclusion

Results of this study focused that the frequency of fecal excretion reduced and urine excretion increased, the standing period became longer, rumination cycle and mastication decreased due to the addition of buffer in the diet. The rumination cycle was completed in a short period and the number of mastication involved in one rumination cycle was less in the last quarter. The time used to chew one bolus was longer in Q_2 and Q_3. Time taken per mastication was shorter in the afternoon session (Q_3). The overall conclusion can be made that the addition of buffer in ruminant nutrition (buffer feed technology) was responsible to reduce rumination in calves.

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Table 4 Animal behavior

Parameters	Period				
	Q_1	Q_2	Q_3	Q_4	CD
Frequency of fecal excretion (n/d)	2.89±0.23$^{(C)}$	3.44±0.12$^{(B)}$	4.06±0.29$^{(A)}$	3.44±0.28$^{(B)}$	0.51
Frequency of urine excretion (n/d)	3.44±0.24	3.17±0.21	3.44±0.12	3.83±0.32	0.77
Standing period (m/d)	234.44±12.49$^{(B)}$	310.56±15.12$^{(A)}$	242.78±10.78$^{(B)}$	161.67±7.05$^{(C)}$	25.69
Sitting period (m/d)	125.56±13.66$^{(B)}$	49.44±8.59$^{(C)}$	117.22±8.93$^{(B)}$	198.33±15.19$^{(A)}$	25.68
Eating period (m/d)	98.89±6.18	163.89±9.90	99.44±3.14	64.44±12.21	24.51
Rumination period(m/d)	125.00±20.40$^{(A)}$	47.22±6.39$^{(C)}$	88.89±4.83$^{(B)}$	113.88±7.97$^{(A)}$	14.34
Resting period (m/d)	168.33±6.19$^{(A)(B)}$	148.89±12.29$^{(B)}$	171.67±8.43$^{(A)}$	182.22±8.06$^{(A)}$	22.45
No rumination cycle(n/d)	125.58±23.96$^{(A)}$	47.29±8.02$^{(C)}$	98.17±7.75$^{(B)}$	136.49±16.38$^{(A)}$	16.15
No mastication (n/d)	6148±1126$^{(A)}$	2345±371$^{(C)}$	4489±228$^{(B)}$	5663±510$^{(A)}$	737
Rumination cycle in standing (s)	57.87±2.83$^{(B)}$	64.47±3.45$^{(A)}$	55.66±2.80$^{(B)}$	47.91±2.30$^{(C)}$	3.54
Rumination cycle in sitting (s)	67.04±2.06$^{(A)}$	60.99±3.09$^{(A)(B)}$	56.38±3.17$^{(B)}$	57.01±3.33$^{(B)}$	4.10
No mastication in one cycle in standing (n)	42.77±1.23$^{(B)}$	51.17±1.66$^{(A)}$	46.83±2.11$^{(A)(B)}$	36.89±1.67$^{(C)}$	2.94
No. Mastication in one cycle in sitting (n)	563.37±2.00$^{(A)}$	49.79±2.48$^{(B)}$	47.01±2.01$^{(B)}$	48.77±2.60$^{(B)}$	5.54
Time per bolus in standing (s)	53.59±2.83$^{(B)}$	61.08±3.16$^{(A)}$	51.80±2.81$^{(B)}$	43.68±2.34$^{(C)}$	3.51
Time per bolus in sitting (s)	62.86±1.93$^{(A)}$	56.83±2.96$^{(A)(B)}$	52.39±3.16$^{(B)}$	52.81±3.26$^{(B)}$	4.89
Time per mastication in standing (s)	1.23±0.05$^{(A)}$	1.19±0.04$^{(A)}$	1.12±0.02$^{(B)}$	1.19±0.05$^{(A)}$	0.00
Time per mastication in sitting (s)	1.12±0.03	1.16±0.04	1.10±0.03	1.08±0.02	0.08
Pause per cycle in standing (s)	4.63±0.17	4.28±0.17	3.86±0.16	4.23±0.21	0.49
Pause per cycle in sitting (s)	4.19±0.25	4.16±2.25	3.99±0.12	4.20±0.22	0.41

References

Chandra P, Kishore A and Ogra J L. 1997. Biodiverification of calcium from feed to milk in does kept under buffer feed technology. Indian J Small Ruminants. 3(1): 15-18.

Kishore A, Chandra P and Ogra J L. 1997. Phenotypic traits of gain in kids on buffers included diets. Indian J Dairy Sci. 50: 448–451.

Dewhurst R J and Webster A J F. 1992. Effects of diet, level of intake, sodium bicarbonate and monensin

on urinary allantoin excretion in sheep. British Journal of Nutrition. 67: 345–353.

Elckelberger R C, Mullar L D, Sweeney T F and Abrams S M. 1985. Addition of buffers to high quality alfalafa hay based diets for dairy cows in early lactation. J Dairy Science. 68(7): 1722-1731.

Fettman M J, Chase L E, Bentinck-Smith J, Coppock C E and Zinn S A. 1984. Restricted Dietary Chloride with Sodium Bicarbonate Supplementation for Holstein Cows in Early Lactation. Journal of Dairy Science. 67(7): 1457-1467.

Ginane C, Bonnet M, Baumont R and Revell D K. 2015. Feeding behaviour in ruminants: a consequence of interactions between a reward system and the regulation of metabolic homeostasis. Animal Production Science. 55: 247–260.

Goetsch A, Gipson T, Askar A and Puchala R. 2010. Feeding behavior of goats. Journal of Animal Science. 88: 361–373.

Hamminger and Krichgassner 1972. Intake of silage with supplements of calcium carbonate and sodium bicarbonate. wirtschaft scigene futter. 18: 122.

Jarrige R, Dulphy J P, Faverdin P, Baumont R and Demarquilly C. 1995. Activité d'ingestion et de rumination. In: R Jarrige, Y Ruckebusch, C Demarquilly, M H Farce and M Journet (eds) Nutrition des ruminants domestiques:ingestion et digestion, INRA, Paris. pp 123-182.

Johnson M A, Sweeney T F and Muller L D. 1988. Effects of Feeding Synthetic Zeolite A and Sodium Bicarbonate on Milk Production Nutrient Digestion, and Rate of Digesta Passage in Dairy Cows. Journal of Dairy Science. 71(4): 946-953.

Kishore A. 1997. Manipulstion of rumen fermentation using buffers in caprine. Ph.D. Thesis, Dr. Bhimrao Ambedkar University, Agra.

Kishore A, Chandra P and Ogra J L. 1998. Protein, energy and Fibre utilization in lactating goats fed on buffer added diet. Indian J Anim Nutr. 15: 276-279.

Kishore A, Chandra P, Singh B P and Ogra J L. 1996. Manipulastion of rumen fermentation using buffers in caprine. In: Proceedings of the VI International Conference on Goats, Beijing, China, May 6-11. International Academic Publishers, Beijing, pp. 338-341.

Provenza F D, Villalba J J, Dziba L E, Atwood S B and Banner R E. 2003. Linking herbivore experience, varied diets, and plant biochemical diversity. Small Ruminant Research. 49: 257–274.

Rogers J A, Muller L D, Snyder T J and Maddox T L. 1985. Milk Production, Nutrient Digestion, and Rate of Digesta Passage in Dairy Cows Fed Long or Chopped Alfalfa Hay Supplemented with Sodium Bicarbonate. Journal of Dairy Science. 68(4): 868-880.

Rogers J A, Marks B C, Davis C C and Clark J A. 1979. Alteration of rumen fermentation on steers by increasing rumen fluid dilution rate mineral salts. J Dairy Science. 62(10): 1559-1605.

Singh H, Kishore A, Chandra P and Ogra J L. 1996. Feeding effect of buffers in improving potentiality of milk

production in goats. In: Proceedings of the VI International Conference on Goats, Beijing, China, May 6-11. International Academic Publishers, Beijing, pp. 338-341.

Snedecor G W and Cochran W G. 1967. Statistical methods. VI ed. IOWA State University Press, Ames.

Solorzano L C, Armentano L E, Grummer R R and Dentine M R. 1989. Effects of Sodium Bicarbonate or Sodium Sesquicarbonate on Lactating Holsteins Fed a High Grain Diet. Journal of Dairy Science. 72(2): 453-461.

Stocks M R. 1983. Effect of sodium bicarbonate on rumen turn over in frequently fed sheep. Canadian Journal of Animal Science. 63(3): 721-725.

Tiwari M, Kishore A, Chandra P and Sachdeva K K. 1996. Excretion behaviour in lactating goats fed on buffers added diets. In: Proceedings of the VI International Conference on Goats, Beijing, China, May 6-11. International Academic Publishers, Beijing, pp. 664.

Toro V A, Nagpaul P K and Chawla M S. 1982. Effect of bicarbonate supplementation on urea utilization by ruminants. Indian Veterinary Journal. 59: 458.

Vallentine J F. 2001. Grazing Management. Burlington Academic Press, San Francisco, 659 pp.

Yang W Z and Beauchemin K A. 2006. Effects of Physically Effective Fiber on Chewing Activity and Ruminal pH of Dairy Cows Fed Diets Based on Barley Silage. Journal of Dairy Science. 89(1): 217-228.

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Urbanization, sustainable agriculture, and food security: issues and challenges

Krishna Kant Sharma and Lalit Mohan Sharma*

Gandhi Smarak P G college, Surjan Nagar, Moradabad (U.P.), India

*Department of Education,
Raja Balwant Singh College, Agra (U.P), India

Abstract

Influences on food and farming in an increasingly urbanized world and the declining ratio of food producers and cultivable land area were studied in the present study. the population of rural areas migrates to the urban centers but in 2008, the world's urban population exceeded its rural population. UN projections expected growth of more than a billion urban people between 2010 and 2025. Development of urban areas was encroaching on the fertile land but also deteriorating the fertility of the land. urbanization has a profound effect on all dimensions of food security and investment in the city infrastructure will be particularly needed in small and medium-sized cities.

Keywords: Food security, Migration, Rural population, Sustainable agriculture, Urbanization.

Introduction

The objective of the present work was to discuss the influences on food and farming in an increasingly urbanized world and the declining ratio of food producers and cultivable land area.

Globally, agricultural production has managed to meet the demands of rapid growth in the proportion of the workforce not producing food (Satterthwaite et al 2010) and rapid changes in food demands towards more energy and greenhouse gas emission-intensive food. Hundreds of millions of urban dwellers face undernutrition today. The work also addressed the influence of the urbanized world on sustainable agriculture and food security. India is a country of more than one billion population on 2.4 % land area of the world (India: Comprehensive geography) (Khullar 2011). Arranging two times meals for such a huge population is a challenge in itself whether it is in terms of production, affordability, and accessibility.

Process

Urbanization is the process of being urban (Vlahov and Galea 2002). Generally, the population of rural areas migrates to the urban centers, and in this process existing urban centers spread or expand themselves on existing agricultural land which causes the shrinking of agricultural land (Bhatia 1992). In 2008, the world's urban population exceeded its rural population for the first time. Today, agriculture provides the livelihood for around one-third of the world's labor force and generates 2–3% of global value-added—although this is misleading in that a significant proportion of industry and services are related to the production, processing, distribution, and sale of food, and other agriculture products.

UN projections suggest that the world's urban population will grow by more than a billion people between 2010 and 2025, while the rural population will hardly grow at all (U N 2012) It is assumed that the proportion of the world population not producing food will continue to develop, as will the number of middle and higher-income consumers whose dietary choices are more energy and greenhouse gas emission-intensive (and often more land-intensive) and where such changes in demand also bring major changes in agriculture and the supply chain.

Urbanization is inevitable in developing because they are yet to achieve saturation like in the developed world. India is also facing the same problem of haphazard growth of population and sprawl of satellite towns on fertile land (Dev 2008). To meet the need for a growing population expansion of agricultural activities on fertile land is required because of low productivity.

Urbanization is not a negative aspect, being urban has various aspect as urban areas has good economic growth and amenities but being prosperous at the cost of basic needs and livelihood of others can't be justified.

Urban sprawl and infrastructure development on fertile land encroaching the cultivable land which is directly affecting the availability of food and going to decline food availability in the coming future, when excessive use of fertile and pesticides will not be fruitful and show adverse effects. Areas around the town and cities are more fertile as has been mentioned in the concentric zone theory of Von Thunen (Clark 1967), encroachment of this area has a more adverse impact.

Food security has three components: first is food availability, which depends on food production and imports, if we depend on imports then it will increase the cost of products, and households of the low-income group would suffer, from malnutrition. Thus it can be said that food security is the link to nutrition security and human development and ultimately to the productive economy of the country. second is food access which depends on purchasing power and the third is good absorption which is a function of safe drinking water, environment, hygiene, and primary health care. All three components of food security are very much linked to urbanization (Dev et al 2003).

Sustainable agriculture can be defined as agriculture that meets the need of the present without compromising the ability of future generations (Lichtfouse et al 2009). It is fact that agriculture production is increasing despite the shrinking of agricultural land, it is because of excessive use of fertilizers, pesticides, and irrigation facilities but all these methods have their limitations, their use cannot be increased beyond a limit. Their excess use after the green revolution has started showing negative consequences in terms of fallow land, saline, and alkaline land, which further declined the availability of land for agriculture. It clearly shows that the need for land area can't be undermined by the name availability of other tools.

Rural to urban migration

Rural to urban migration is an important cause of urbanization; a check on this migration is needed. This can be done by providing urban amenities in rural areas and developing small and medium population centers rather than focusing on large urban centers.

Inclusive development can solve the discussed problem. Unidirectional development causes another problem. Because of being a monsoonal country that is characterized by untimely and unequal distribution of rainfall, without irrigation facilities, food requirements cannot be fulfilled. But the development of irrigation facilities in every area is also not possible because of the constraining of resources

and topographical conditions of a country. The larger part of India is suitable for dry land agriculture. Which country will have to focus on research in this field as the development of a drought-resistant variety of seeds? An increase in the production of food grain will not only meet the need for increased demand for food grain but also the affordability of households of that region because of the increase in their income. Another measure that can be adopted is the development of micro irrigation projects and the liking of rivers wherever possible.

The development of urban areas is not only encroaching the fertile land but also deteriorating the fertility of the land in peripheral areas through discharging untreated industrial waste and polluting rivers and canals (Bhuvan 2013). For example, the Agra canal which originates from the Yamuna near Okhla (Delhi) is polluted by the discharge of industrial waste from the Okhla industrial region, affecting the agriculture of Agra and Mathura regions which are benefited from this canal.

Negative impacts on agriculture

Urbanization is often considered as having negative impacts on agriculture, for instance, from the loss of agricultural land to urban expansion and an urban bias in public funding for infrastructure, services, and subsidies (Bezemer and Headey 2008). But the scale of urban poverty proposes a slight indication of municipal bias for much of the urban people and obviously, urban demand for agricultural products has great importance for rural incomes. The farmers and rural consumers also rely on urban-based enterprises for an extensive range of goods and services-including access to markets. So the key question is whether the growing and changing anxieties for food (and other agricultural products) that a progressively urbanized people and economy bring can help underpin agricultural and rural success and sustainability within a worldwide decline in agricultural land area per person and water constraints. To this is now added the need to adapt to the influences of climate change that can disrupt agriculture and urban demand, and the town enterprises that provide the manufacturer and consumer services to rustic populations. We found that urbanization has a profound effect on all dimensions of food security and investment in the city infrastructure will be particularly needed in small and medium-sized cities.

References

Bezemer D and Headey D. 2008. Agriculture, Development, and Urban Bias. World Development. 36(8): 1342-1364.

Vlahov D and Galea S. 2002. Urbanization, urbanicity, and health. Journal of Urban Health. 79(Suppl 1):, S1–S12.

Bhatia A S. 1992. Rural-Urban Migration. Deep and Deep Publications, New Delhi, pp.123-146.

Bhuvan N. 2013. Gateway to Indian Earth Observation. National Remote Sensing Centre, Hyderabad.

Clark C 1967. Von Thunen's Isolated State. New Series. 19(11): 370-377.

Dev S M, Kannan K P and Ramachandran N. 2003. Towards a Food Secure India. Institute for Human Development, pp 464.

Dev S M. 2008. Inclusive Growth in India: Agriculture, Poverty and Human Development. Oxford University Press, Delhi.

Khullar D R. 2011. India: Comprehensive Geography. Kalyani Publishers, New Delhi.

Lichtfouse E, Navarrete M, Debaeke P, Souchere V, Alberola C and

Ménassieu J. 2009. Agronomy for Sustainable Agriculture: A Review. In: E Lichtfouse, M Navarrete, P Debaeke, S Veronique, C Alberola (eds) Sustainable Agriculture. Springer, Dordrecht, pp 1–7.

Satterthwaite D, McGranahan G and Tacoli C. 2010. Urbanization and its implications for food and farming. Philosophical Transactions of the Royal Society B. 365: 2809–2820.

U N. 2012. Population Estimate, and Projection Section. United Nations, Department of Economic and Social Affairs, Population Division. Kalyani Publishers, New Delhi.

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A critical review on peer education regarding sits and HIV prevention in India

Lalit Mohan Sharma

Department of Education
Raja Balwant Singh College, Agra-282002, INDIA

Abstract

Peer education is also known as peer learning or peer mentoring. Peer education is surrounded by considerable ambiguity to encourage greater clarity in an operational framework. This education is a community-based intervention being implemented worldwide. Two different forms of peer learning, "peer tutoring" and "peer collaboration," are distinguished. It has its potential as peer tutoring for transmitting information and drilling special skills. One of the beliefs of peer education is that it is cost-effective. Peer education has been identified as a more economical way to deliver health training. Peer education advocates of peer education rarely refer to theories in their rationale for particular projects. Peer education is much more consistent in the country in comparison to other innovations in education regarding health care. Peer education offers educators the opportunity to benefit from taking on meaningful roles. Peer education in India is presumed to be an essential part of the syllabus to be delivered before young learners.

Keywords: Peer collaboration, Peer education, Peer learning, Peer tutorial, HIV, SIT.

Peer education is also known as peer learning or peer mentoring. Peer Education is an approach to health promotion, in which community members are supported to promote health-enhancing change among their peers. Peer education is the teaching or sharing of health information, values, and behavior in educating others who may share similar social backgrounds or life experiences (Boyle et al 2011, Sriranganathan et al 2010). Sexually Transmitted Infections (STIs), including HIV (Human Immunodeficiency Virus), mainly affect sexually active young people and are a vital problem in India being vigorous every day. More than one-third of students in this study had no accurate understanding of the signs and symptoms of STIs other than HIV/AIDS. Causes of the increased rates of STIs/HIV in young people are complex, however, the main reasons include biological factors, risky sexual behavior patterns (early initiation of sex, premarital sex, bisexual orientation, and multiple sexual partners), transmission dynamics and treatment-seeking behavior (Harms et al 1998).

Although popular, peer education is surrounded by considerable ambiguity. To encourage greater clarity an operational framework (Shiner 1999). The author recommends that consideration should be given to what constitutes "peers", the aims and methods of an intervention, and how peer educators are involved. Reflecting a gap in the existing literature, particular attention is paid to the nature of peer

involvement. A key distinction is posited between "peer development" and "peer delivery" and it is suggested that there is a "fit" between location, approach, and client group.

Damon (1984) discovered to two different forms of peer learning, "peer tutoring" and "peer collaboration," are distinguished. Each has its potential use: peer tutoring for transmitting information and drilling special skills; peer collaboration for facilitating intellectual discovery and the acquisition of basic knowledge. Damon and Phepls (1989) presented critical distinctions among three approaches to peer education. Peer tutoring, cooperative learning, and peer collaboration are contrasted with one another along dimensions of equality and mutuality of engagement. It is argued that peer tutoring tends to foster dialogues that are relatively low on equality and varied in mutuality; cooperative learning fosters ones that are relatively high in inequality and low to moderate in mutuality, and peer collaboration fosters ones that are high in both. There are also some important variations in task and reward structure that cut across the three approaches. In general, the peer learning arrangements that seem most likely to generate productive instructional dialogues are those that encourage joint problem solving, that rely on intrinsic rather than extrinsic rewards, and that discourage competition between students.

Peers and peer education are important to influence and approach changing health behaviors. One of the beliefs of peer education is that it is cost-effective. Peer education has been identified as a more economical way to deliver health training (Wiskochil et al 2007).

Peer education advocates of peer education rarely refer to theories in their rationale for particular projects. Turner and Shepherd (1999) review a selection of commonly cited theories, and examine to what extent they have value and relevance to peer education in health promotion. Whereas most concepts have something to suggest towards the elucidation of why peer education might be operative, most principles are limited in possibility and there is little experiential evidence in health promotion practice to support them. Peer education would seem to be a method in search of a theory rather than the application of theory to repetition. Starting from the assumption that gender inequalities play a key role in driving the epidemic amongst young people, Campbell and MacPhail (2002) outline a framework for conceptualizing the processes underlying successful peer education.

There is rising evidence of augmented premarital sexual actions among young persons. While generalization is difficult, studies indicate that between 20% and 30% of young men and up to 10% of young women have premarital sexual experiences. Women have a higher incidence of STIs than men because of their greater biological susceptibility (UNFPA 2004). Peer education is empowering from both the standpoint of the peer educator and the individual receiving service. Peer education has been operative in encouraging knowledge, attitudes, and intention to change behavior in AIDS prevention. The results of implementing peer education are inconsistent, with little consensus on why some projects succeed while others fail in India. It can be concluded that the lessons learned and implications for current trends in peer education are much more consistent (Wight et al 2002) in the country in comparison to other innovations in education regarding health care.

Peer education offers educators the opportunity to benefit from taking on meaningful roles. Peer educators can act as enthusiastic advocates for the program and have a sense of purpose in their community outreach efforts (Kim et al 2004).

Peer education is a community-based intervention being implemented worldwide as an approach to HIV prevention (Cornish and Campbell 2009). They concluded with lessons learned and implications for current trends in peer education when comparing two HIV prevention programs run by sex workers in India and South Africa.

Peer-based outreach is a popular strategy in which former or current drug addicts are employed as peer educators to contact and educate out-of-treatment addicts (Dhand 2006). The research workers reported that to provide insight into issues of empowerment, peer relationship dynamics, and social diffusion processes among drug-using communities, and peer-based situations more generally (Dhand 2006).

Peer education in India is presumed to be an essential part of the syllabus to be delivered before young learners. NACO, (2005) is of the view that young adults aged 15–29 years, account for 32% of AIDS (acquired immunodeficiency syndrome) cases reported in India and the number of young women living with HIV/AIDS is twice that of young men.

References

Boyle J, Mattern C O, Lassiter J W and Ritzler M S. 2011. Peer 2 peer: Efficacy of a course-based peer education intervention to increase physical activity among college students. Journal of American College Health. 59(6): 519-529.

Campbell C and MacPhail C. 2002. Peer education, gender and the development of critical consciousness: participatory HIV prevention by South African youth. Social Science & Medicine. 55(2): 331–345.

Cornish F and Campbell C. 2009. The Social Conditions for Successful Peer Education: A Comparison of Two HIV Prevention Programs Run by Sex Workers in India and South Africa. *American Journal of Community Psychology,* 44(1-2): 123-135.

Damon W. 1984. Peer education: The untapped potential. Journal of Applied Developmental Psychology. 5: 4331–343.

Damon W and Phelps E. 1989. Critical distinctions among three approaches to peer education. International Journal of Educational Research. 13(1): 9–19.

Dhand A. 2006. The roles performed by peer educators during outreach among heroin addicts in India: Ethnographic insights. Social Science & Medicine. 63(10): 2674–2685.

Harms G, Corea A, Iyambo S, Radebe F, Fehler H and Ballard R. 1998. Perceptions and patterns of reproductive tract infections in a young rural population in Namibia. In: 2nd European Congress on Tropical Medicine. Liverpool, UK.

Kim S, Koniak-Griffin D, Flaskerud J H and Guarnero P A. 2004. The impact of lay health advisors on cardiovascular health promotion. Journal of Cardiovascular Nursing. 19(3): 192-199.

NACO 2005. Monthly Updates on AIDS.

Shiner M. 1999. Defining peer education. Journal of Adolescence. 22(4): 555–566.

Sriranganathan G. Jaworsky D. Larkin J. Flicker S. Campbell L. Flynn S. Janssen J and Erlich L. 2010. Peer sexual health education: Interventions for effective program

evaluation. Health Education Journal, 71(1): 62-71.

Turner G and Shepherd J. 1999. A method in search of a theory: peer education and health promotion. Health Educ. Res. 14(2): 235-247.

UNFPA 2004. Sexually Transmitted Infections: Breaking the Cycle of Transmission. New York: United Nations Population Fund.

Wight D, Raab G M, Henderson M, Abraham C, Buston K, Hart G and Scott S. 2002. Limits of teacher delivered sex education: interim behavioural outcomes from randomised trial. BMJ. 324: 1430

Wiskochil B, Lieberman L, Houston-Wilson C and Petersen S. 2007. The effects of trained peer tutors on the physical education of children who are visually impaired. Journal of Visual Impairment & Blindness, 101(6): 339-350.

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Mineral profile of human hairs as influenced by oral supplementation of vitamin 'A'

Sushil Kumar Sharma and Babita Agarwal
Department of Chemistry
Babu Shivnath Agarwal College, Mathura-281001, India

Abstract

To find out the influence of oral administration of vitamin A on the mineral profile of human hairs, six adults i.e., persons. (3 males and 3 females) selected randomly from the group based on various traits (age 30.2±3.5 Y; live weight 60.1±5.4 Kg; annual income 105833.3±30342 Rs) were given identical feed as per the specification of ICMR, to meet their daily nutritional requirements. They were given oral administration of vitamin A at the rate of 5000 IU per Kg live weight, in the morning daily. Samples of hairs collected from the various parts of the body on the days 00, 30, 90, and 120 of the experimental trial were subjected to estimation of major (Calcium, phosphorus, and magnesium) and trace (Sodium, Cobalt, Copper, Iron, and Nickel) elements using standard techniques. Collected data were analyzed statistically using standards to draw a valid conclusion. It can be concluded based on the present investigation that enhancement in iron content of human hairs was outstanding, contents of phosphorus and magnesium were also increased but those of calcium, sodium, cobalt, copper, and nickel in the hairs remained unchanged due to supplementation of this vitamin.

Keywords: Hairs, Human, Iron, Minerals, Vitamin A.

Introduction

Hair cycle-dependent changes in adrenergic skin innervations on the one hand, and hair growth modulation by isoproterenol, accompanied by changes in β2-adrenoreceptor expression of selected regions of the hair follicle epithelium on the other (Botchkarev *et al.,* 1999), further support the concept that bi-directional interactions between the hair follicle and its innervations play a part in hair growth control. The general role of trace metals in carcinogenesis indicated an appreciably different pattern of selected metal distribution and their mutual correlations in the hairs of cancer/ benign patients in comparison with the normal donors (Ali, 2008). Robbins and Kelly, (1970) compared amino acid data from human hair with that from Merino wool and indicated substantial differences between cystine, glycine, tyrosine, and phenylalanine.

Selenium is involved in antioxidant activity and therefore can be considered synergistic with vitamin A. Both vitamin A and selenium have similar effects on inhibiting carcinogenesis (Clement, 1987). Other minerals synergistic with vitamin A include magnesium, manganese, potassium, and phosphorus. Like vitamin A, these minerals are closely related to thyroid function. Watts, (1991) showed the minerals that are considered antagonistic to vitamin A. Vitamin A may also be mutually antagonistic to these elements. Excessive tissue iron accumulation may increase vitamin A requirements due to destruction by peroxidation.

Attention has yet not been given to studying the effect of vitamin A on the mineral profile of human hair. The present investigation was an effort to make attempts to find out the influence of oral administration of vitamin A on the mineral profile of human hairs.

Materials and Methods

The study was carried out on six adults(3 males and 3 females) persons selected randomly from the group in village Chaumuhan of Mathura district of UP, based on various traits (age 30.2±3.5 Y; live weight 60.1±5.4 Kg; annual income 105833.3±30342 Rs.). The subjected persons remained at their homes and were allowed to act as their normal daily routine works. They were given identical feed as per the specification of ICMR, to meet their daily nutritional requirements. The steps were taken for Deworming under the prescription and supervision of a registered medical practitioner to make sure that they will remain free from internal and external parasitic infection during the investigation.

They were given oral administration of vitamin A at the rate of 5000 IU per Kg live weight, in the morning daily. Samples of hairs were collected from the various parts of the body on days 00, 30, 90, and 120 of the experimental trial. The collected samples were subjected to estimation of major (Calcium, phosphorus, and magnesium) and trace (Sodium, Cobalt, Copper, Iron, and Nickel) elements using standard techniques. The trace minerals in hair samples were analyzed by atomic absorption spectrometer (GBC Avanta PM) using acetylene as fuel and air as oxidant. The cobalt content was estimated with the help of an automated graphite furnace system (GBC GF 3000) using an autosampler (PAL 3000). Among the major elements, calcium was determined by the calcium oxalate precipitation method (AOAC, 1992), phosphorus by the calorimetric method (Ward and Johnson, 1962), and magnesium by magnesium ammonium phosphate precipitation method (McCance and Shipp, 1933; Holzapfel, 1934). Collected data were analyzed statistically using standard techniques (Snedecor and Cochran, 1994) to draw a valid conclusion. SPSS software (SPSS, 1998) was implemented for various statistical calculations for the purpose. The graphic presentation was prepared using Microsoft excel software (MS Office, 2006).

Results and Discussion

The most affected ($p<0.01$) element in human hair due to oral supplementation of vitamin A was observed to be iron (Table, Figure 1 and 2) and the increment in this regard was recorded even up to 67 per cent. Vitamin A has a synergistic effect on iron because of its antioxidant property (Watts, 1991), and caused enhancement of this element in human hairs. The increase ($p<0.01$) in phosphorus and magnesium content in hairs was also caused due to supplementation of this vitamin but the intensity in this regard was not too high and remained only up to about 5 and 3 per cent, respectively. The respected values recorded on day 0 of the experimental trial confirmed the findings of Clement, (1987); Iyengar and Wolttlez, (1988); Watts, (1991), and Onwuka *et al*. (2001). In blood serum, similar trends were also observed (Watts, 1991; Ali, 2008; Raoofi *et al*., 2010).

Table: Mineral profile of human hairs (mg/Kg)

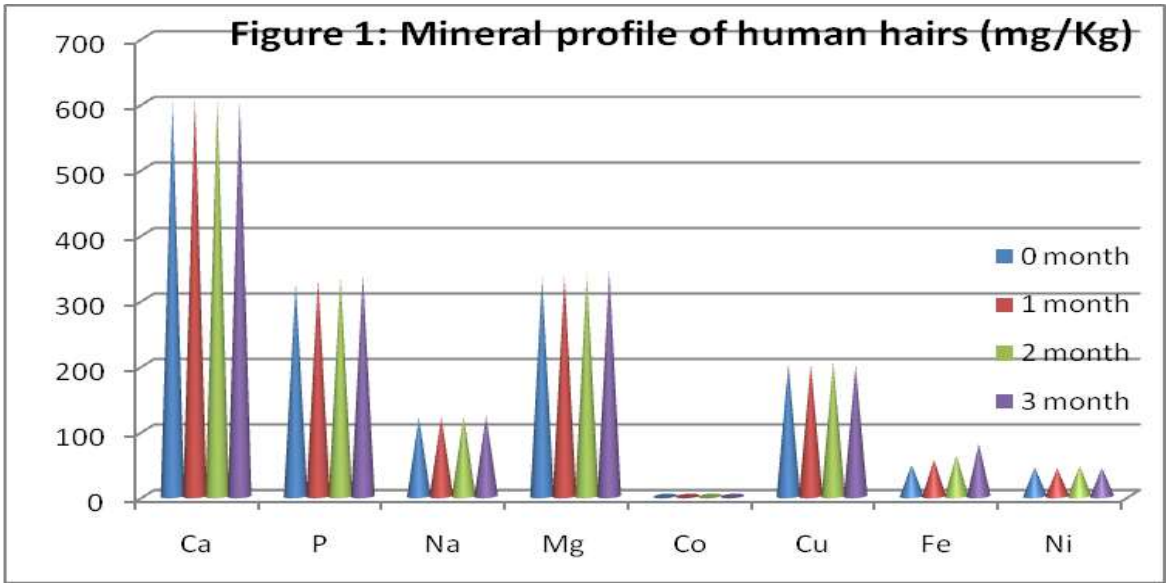
Component	Unit	0 month	1 month	2 month	3 month
Calcium	(mg/Kg)	601.5±3.1	606.0±4.1	605.7±5.9	603.3±2.7

Phosphorus	(mg/Kg)	325.0±1.4^{d}	331.7±0.6^{c}	335.5±0.6^{b}	338.3±0.4^{a}
Sodium	(mg/Kg)	120.0±2.1	120.5±2.7	121.8±4.2	122.5±3.3
Magnesium	(mg/Kg)	333.2±2.6^{b}	335.7±2.3^{b}	338.7±2.6^{a,b}	344.0±2.6^{a}
Cobalt	(mg/Kg)	1.03±0.03	1.12±0.02	1.07±0.02	1.15±0.05
Copper	(mg/Kg)	202.2±7.5	201.7±2.3	205.2±2.3	200.2±1.5
Iron	(mg/Kg)	48.2±0.9^{d}	55.5±0.8^{c}	62.7±0.9^{b}	80.2±1.1^{a}
Nickel	(mg/Kg)	44.3±1.6	42.3±1.6	45.5±1.5	43.3±2.2

^{a,b,c,d} - *Values bearing different superscripts differed significantly, i.e. p,0.01.*

The content of calcium, sodium, cobalt, copper, and nickel in human hairs remained unaffected due to oral supplementation of vitamin A. As far as the values of these constituents in human hairs on day 0 of the experimental trial are concerned, those confirmed the findings of Clement, (1987); Iyengar and Wolttlez, (1988); Watts, (1991); Onwuka *et al*. (2001) and Ali, (2008). Detailed information was found not available to show the impact of vitamin A supplementation on hairs composition but, in blood serum, a similar trend was observed (Ali, 2008; Raoofi *et al*., 2010).

It can be concluded based on the present investigation that enhancement in the iron content of human hairs due to vitamin A supplementation was outstanding. The content of phosphorus and magnesium was also increased but calcium, sodium, cobalt, copper, and nickel in the hairs remained unchanged due to the supplementation of this vitamin.



References

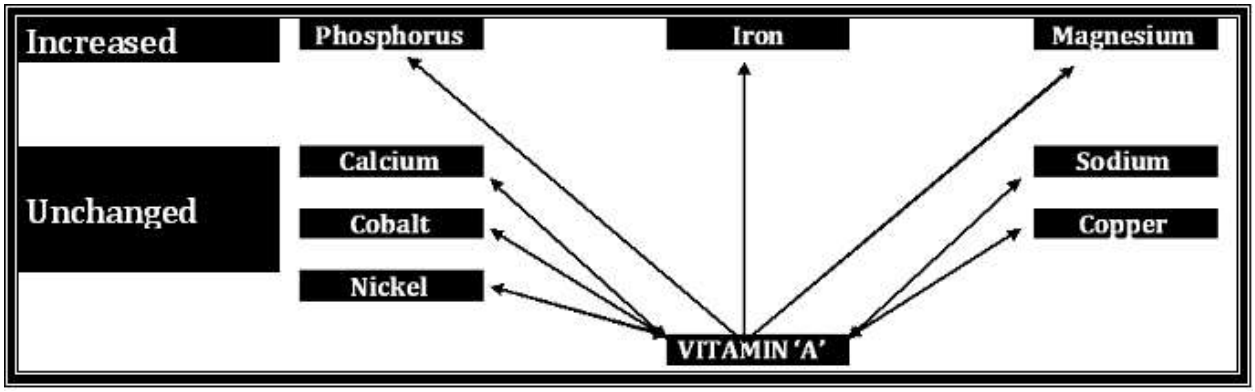
Ali Q M. 2008. Trace metals in scalp hair, plasma and tissues as an index of cancer. Thesis: Ph.D., Department of Biochemistry, Quaid-I-Azam University Islamabad.

AOAC 1992. Official Methods of Analysis. Association of Official Analytical Chemists. 14th Edn., Washington, DC.

Botchkarev V A, Peters E M J, Botchkareva N V, Maurer M and Paus R. 1999. Hair Cycle-Dependent Changes in Adrenergic Skin Innervation, and Hair Growth Modulation by Adrenergic Drugs. Journal of Investigative Dermatology. 113: 878–887.

Clement I. 1987. Susceptibility of Mammary Carcinogenesis in Response to Dietary Selenium Levels: Modification by Fat and Vitamin Intake. In: Selenium in Biology and Medicine, Part B. G F Coombs, J.E Spallholz, O A Levander, J E Oldfield (eds.), Van Norstrand Reinhold Co., N Y.

Figure 2: Effect of Vitamin A supplementation on the mineral profile of human hairs



Holzapfel C R. 1934. Onderstepoori Journal of Vet. Science and Anim. Ind. 2: 115-122.

Iyengar V And Wolttlez J. 1988. Trace Elements in Human Clinical Specimens: Evaluation of Literature Data to Identify Reference Values. Clinical Chemistry, 34(3): 474-481.

McCance R A and Shipp H L. 1933. Medical Research Council, Special Report, Serial No. 187.

MS Office. 2006. Microsoft office 2007: Microsoft Excel. New York, Microsoft Inc.

Onwuka S K, Avwioro O G, Akpan M O and Yahaya A. 2001. Distribution of cobalt, manganese and iron in the skin and hair of West African dwarf sheep and goats in Nigeria. African Journal of Biomedical Research, 4(3): 151-154.

Raoofi A, Asadi F, Mardjanmehr S H and Kazempoor R. 2010. The effects of hypervitaminosis A in sheep following intramuscular administrations of vitamin A. Food and Chemical Toxicology, 48(1): 193-195.

Robbins C R and Kelly C H. 1970. Amino Acid Composition of Human Hair. Textile Research Journal 40(10): 891-896.

Snedecor G W and Cochran W G. 1994. Statistical Methods, 8th Ed., Ames, Iowa State University Press.

SPSS 1998. SPSS for Windows. Standard Version. New Yok, SPSS Inc., released on 18 December.

Ward G M and Johnson F B. 1962. Chemical methods of Plant Analysis, Publication No. 1060, Research Branch, Canada, Department of Agriculture.

Watts D L. 1991. The Nutritional Relationships of Vitamin A. Journal of Orthomolecular Medicine, 6(1): 27-30.

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2.2 SHORT RESEARCH NOTES not more than 1,500 words (about 4-5 typed pages), which deals with (a) research results which are complete but do not warrant comprehensive treatment, and (b) descriptions of new material or improved techniques, with supporting data. Such notes require no headed sections. Summary (not more than 80-100 words) is to be provided at the end of the text.

2.3 CRITICAL RESEARCH REVIEW pointing out lacunae in research and suggesting possible lines of future work.

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Section Policies

Sections	Checked Open Submissions	Checked Indexed	Checked Peer Reviewed
Review Article	Yes	Yes	Yes
Articles	Yes	Yes	Yes
Short-Communication	Yes	Yes	Yes
Special Feature	Yes	Yes	Yes
Invited Review	Yes	Yes	Yes
Graphical Abstract	Yes	Yes	Yes

Peer Review Process

Each paper submitted for publication is sent to independent referees for peer review. They are selected on expertise in one or more areas of paper, no conflicts of interest, ability to think clearly and logically, ability to write a good critique, accurate, reliable in returning reviews, and ability to do the review in the allotted time frame.

Referees are expected to respond to the editor's request for advice within a limited period (15 days), which is clearly stated by the editor. A comment sheet is also provided to him for seeking his advice on all aspects of the article. He is advised to return the script immediately without comments if he can't attend to a manuscript within this period so that the editor can send it to another referee without further delay.

Comments from the referee are received by the editor

If the reports of both referees disagree concerning the suitability of the paper for publication, the advice of a third referee is sought.

Comments received from both referees: The article is sent to the corresponding author through email only for modification along with comments from referees. At this stage, the editor completes the preliminary editing. It includes checking in-house style (presentation of title, affiliations, present address, abstract, scientific nomenclature, text, and reference presentation).

Comments not received from both referees: If comments are not received from both referees, a reminder is sent to them.

Reminder to referee from whom the comments are not received: If comments are not received from one referee, a reminder is sent to him.

Comments not received from one referee: A reminder is sent to the referee who is not responding.

A reminder is sent to the referee who is not responding to the editor's request. However, if his reply is not coming in a stipulated time, the editor takes suitable action based on comments received from one referee.

Rejection of the article based on comments of referees: The article is rejected based on the comments of referees/referees. The corresponding author is informed accordingly.

The corresponding author does not agree with the adverse comments of the referee or in the meantime, suitable comments are received from the second referee. Editor's decision independently or in consultation with the editorial board is final and not challengeable elsewhere. The editor may ask the first referee or a third referee to go through the comments of the first referee and reply to communicating author to comments of the referee and /or contradictory comments of the second referee.

Favorable comments are received from the second referee after the modification: Input of the second referee is incorporated in the modified article. The corresponding author is contacted if the referee asks for the inclusion of more information in the form of a table, figs, or references.

Adverse comments received from the second referee at any stage: The corresponding author is informed of the adverse comments from the second referee and action is stalled (even at the proof stage) till the final decision.

The editor's decision independently or in consultation with the editorial board is final. Acceptance of the article is sent to the corresponding author.

Publication Frequency

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Publication Language

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