J. Animal and Poultry Prod., Mansoura Univ., Vol. 10 (4): 89 - 94, 2019

Impact of Housing Patterns on Physiological and Production Performance for Egyptian Buffaloes and Cows in Nile Valley

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ABSTRACT

The present study was connected in Nile Valley (Beni Suef Governorate). Data was collected from the seven districts within Governorate (from December 2013 to June 2015). The main objects were to study the impact of different patterns of roof house on physiological and productive performance for buffaloes and cows under environmental condition in Nile Valley. Also, to study the relationship between bedding under animal and gases emissions of house to mat modifications to reduced impact of climatic change. Addition to the best system of animal housing under this environmental conditions. Meteorological data including air temperature (AT °C), relative humidity (RH %), during the experimental period to calculate temperature humidity index (THI). The productive performance: recording total milk yield (TMY/kg) and lactation period (LP/ day). Physiological performance: recording respiration rate (RR r/min). Recording emission gas (N_2O/L) from bedded under animal and (CO_2/L) was estimated from N_2O. The semi open System was the lower value of heat dissipation (HD/°C) under environmental in Nile valley. The best roof was mat and maize stoke respectively for two species. Cottonwood good bedded compared with rice straw ^{to} reduce emission gas. Dirt land only was good without any bedded from values of RR r/min, heat dissipation from house (HDH/°C) and gas emissions (GE/L) for two species. Values of total milk yield were high for two species under mat and maize stoke roof, and the higher value was for buffalo compared with cow. The data was recorded highly significant effect ($P \leq 0.001$) for the interactions between type of roof and type of bedded on all items under this study., and the best system of animal house under the environmental conditions in Nile valley was semi open system , the roof from meat and the dirty land without bedded .

Keywords: Animal house, Roof, bedded and climatic conditions.

INTRODUCTION

Weather is a constraint on efficient livestock production systems is difficult, but necessary task before selection of appropriate modifications in management or environments can be made. The basis for rational election from available alternatives for the limitation of climatic stress in livestock has continued to improve, particularly with the development of rudimentary functional (Hahn1981). Climatic change is a global phenomenon its negative impacts are more severely felt by poor people in under developed countries. Although agricultural producers, especially small scale poor farmers, are relatively small contributors of CO_2 emissions, proper agricultural technology and management systems are crucial to cope with the complexity of ecosystem and climates IPCC (2013). Livestock production will not be excluded from the impact of climate change, approximately 20-30 percent of plant and animal species are expected to be at risk of extinction in global average temperature expected 1.5-2.5°C (FAO, 2007). The IPCC (2013) report identified the "likely range" of increase in global average surface temperature by year of 2100, which is between 0.3 °C and 4.8 °C. The change on livestock include changes in production and quality of feed crop and forage (Thornton *et al*., 2009; IFAD, 2010; Polley *et al*., 2013), animal growth and milk production (Thornton *et al*., 2009; Nardone *et al*., 2010; Omran and Fooda, 2013; Omran *et al*., 2017).

Khalil and Omran (2018) reported, that predicts of climatic change on Temperature Humidity Index (THI) values in different three regions (Lower, Middle and Upper of Egypt). During the period from 2016 up to 2060 expectant significant changes in THI values. The classifications of THI during the study period found that the moderate class shows significant gradual increase with time in all studied governorates (12) and none stress class percentage tends to decrease in all governorates to the account of increasing the mild and moderate classes.

System of housing is mainly designed to suite the requirements of temperature climate and has proved unsuitable for tropical climate. To reduced effect of environmental condition for animal or animal to environmental condition we needed to modification of house only or house and nutrition ., Bond and Kelly(1955) and Hahn (1981) reported that Shade for dairy cows (production from solar radiation) is considered essential to minimize loss in milk production and reproductive efficiency. In addition to total heat load could be reduced from 30 to 50 % with a well-designed shade.

Hahn (1981) reported that all livestock need protection from climatic extremes even in moderate climatic regions, primarily to insure survival of animals for continued production and reproduction. Protection includes trees or adequate solid-roofed shades in hot weather (1.8 to 1.2m^2/ head for large species, 0.7 to 1.2 m^2/ head for smaller species, preferably white painted sheet metal for artificial shades) and fence line windbreaks or open sheds in cold weather.

Different types of animal houses are constructed without any careful planning and designing. Thomas and Sastry (1991) reported that shelter system not only fulfill its principal function but also providing to health sustaining and comfortable environment to animal behavioral and physiological responses are initiated to increased heat loss and reduce heat production in an attempt to maintain body temperature within the range of normality.

The main objects were studded the impact of different patterns roof house on physiological and productive performance for buffaloes and cows under environmental condition in Nile Valley. Also, studded relationship between bedded under animal and gases emission's in house to mod modifications to reduce the impact of climatic change. Addition to select the best systems of animal housing under this environmental conditions.

MATERIALS AND METHODS

The present study was in Nile Valley (Beni-Suef Governorate)., Data was collected from the seven districts, within each districts10 villages., average the farms visited into village (5 farms)., December (2013) beginning of the experiment are following the visit monthly to June (2015).

(10 villages into each district & 5 farms into village &2 visits to each district &7 districts within etch Governorate)

Total observations were 419 (Type of animal house: 19 close, 118 open and 55 semi open and 227 outside. The outside was divided between under tree, inside the terraces of the woven, clay and covered with palm leaves, behind the house in the rings of iron and inside the house at the night only. The place of housing was different between: inside farmer house(33.33%) , middle of cultivated area(47.92%), reclaimed area(16.67%) and next to canals(2.08%). The high percentage was middle of cultivated.

Most of watering (92%) by spouts was the salinity of water 400 ppm, and the higher values of water salinity was 3500 ppm from well in reclaims area., Watering under shaded maintain suitable salinity of water salinity increased during day between 30 to 50 ppm without shaded. Type of roof: Palm leaves (model 1), wood veins, cotton wood and rice straw (model 2), sheet metals (model 3), asbestos (model 4), wood and canvas (model 5), cement (model 6), mat (model 7) and maize stoke (model 8). The bedded of land under the animal were; dirt land (model 1), rice straw (model 2), a mixture from cottonwood and rice straw (model 3) and cottonwood only (model 4).The high of roof ranged between 1.70 mm to 4.50 mm the highest of roof reduces the heat dissipation from roof to animal while the range of reduces under study. Air temperature (AT°C) and relative humidity (RH %) were recorded to calculate temperature humidity index (THI) around the animals by using equation of Mader *et.al.* (2006) as following:

$$THI= (0.8 * T) + [(RH/100) * (T - 14.4)] + 46.4,$$

[T= Air temperature (°C) and RH= Relative humidity (%)]

Heat dissipation (HD/°C) was recording for house (H) and animal (A), The temperature of housing was (roof, land, water, nutrition basins, and available cement blast walls and iron pipes) by using scichemtech infrared thermometer, (1): heat reflection from house to animal (HDH/°C), and (2): from animal to house (head, neck, abdominal and bake) by infrared thermometer (HDA/°C). The physiological performance was respiration rate (RR r/min). The data of productive were total milk yield (TMY /kg) and lactation period (LP/ day). And emission gas (N_2O/L) was recorded from bedded under animal by using VARE Multi Gas Monitor (PGM-7800 & 7840) and ($CO_{2/}$ L) was estimated from N_2O by multiplying the later by a factor of (310) according to the Global Worming Potential (GWP).

Statistical Analysis:

Relevant statistical analysis of data was carried out applying the statistical analysis system (SAS, 2002,GLM) according to the following model:

$$Y_{ijklm} = \mu + A_i + R_j + B_k + T_l + (A*R)_{ij} + (AB)_{ik} + (AT)_{il} + (RB)_{jk} + (RT)_{jl} + (BT)_{kl} + E_{ijklm}$$

Where:

Y_{ijklm} : Observation on the m^th^ animals of the i^th^ sex of animal j^th^ in the type of roof in the k^th^ in the type of bedded in the l^th^ in the classes of THI,

μ : Overall mean,

A_i : Fixed effect due to sex of animal (i: 1= Adult animal, 2 =Male and 3= female),

R_j : Fixed effect due to the type of roof (j: 1 = Palm leaves, 2 = wood veins, Cottonwood and rice straw, 3 = sheet metals, 4 = asbestos, 5= wood and canvas, 6= cement, 7= mat and 8= maize stoke)

B_k : Fixed effect due to the type of bedded land (k: 1 = dirt land, 2 = rice straw, 3= mixture from cottonwood and rice straw and 4= cottonwood only),

T_l : fixed effect due to the classes of THI (j: 1= Thermo neutral, 2= Mild heat stress, 3= Moderate heat stress, 4= Severe heat stress and 5= Very severe heat stress),

$(AR)_{ij}$: The interaction between sex of animal and type of roof,

$(AB)_{jk}$: The interaction between sex of animal and type of bedded land,

$(AT)_{il}$: The interaction between sex of animal and the classes of THI,

$(RB)_{jk}$: The interaction between type of roof and type of bedded land,

$(RT)_{jl}$: The interaction between type of roof and the classes of THI,

$(BT)_{kl}$: The interaction between type of bedded land and the classes of THI,

E_{ijklm} : Random error assumed N.I.D. (0, σ^2e).

RESULTS AND DISCUSSION

Table (1) shows mean ± SE for temperature humidity index (THI) classified under natural environmental conditions in Nile valley based on changes in respiration rate (RR, r/min) for animals. THI values were at Thermo-Neutral condition ≤ 65.08, Mild heat stress< 71.28, and Moderate heat stress < 84.38 and at Severe heat stress ≤ 87.45, these are within the range of the literature. Omran and Fooda (2013) under condition of Nile valley (Giza Governorate) reported that the THI is commonly indicator of degree of climatic stress on animals were a THI of (Thermo neutral ≤ 68, mild Heat stress < 74, moderate Heat stress < 82, sever Heat stress ≤ 87 and. Fuquay (1981) results that the THI of 72 and below considered as no heat stress (cool), 73-77 as mild Heat stress , 78-89 as moderate Heat stress and above 90 as severe Heat stress . Any improved of THI index will ideally be useful as a base for continued development of biological responses and representative of consequences resulting from primary factors to energy exchange (Hahn *et. al.* 2003 and Omran and Fooda 2013).

Table 1. Classification of natural environmental condition (Mean± SE) according respiration rate (RR r/min) of animal under temperature humidity index (THI) under neutral environmental conditions in Nile Valley

Classification	Thermo-neutral	Mild heat stress	Moderate heat stress	Severe Heat Stress
Value of THI	65.08 ±0.19	71.28 ±0.13	84.38 ±0.10	87.45 ±0.07

Table (2) shows mean ± SE for heat dissipation from different of systems of housing (open, semi open and close) as general average to each system under neutral environmental conditions in Nile valley. The highest significant value of heat dissipation (HD/°C) from house to animal was (34.1/°C) at close system due to highest of relative humidity (RH%) within close system., Also solar radiation absorbed by wall and roof all day reflected to physiological and production performance of animals due to heat stress (Ashour *et al* 2000, Omran *et al* 2013). The lower values was (28.1/°C) at semi open system.

Table 2. (Mean ± SE) Heat dissipation (HD/°C) for different systems of housing (open, semi open and close) as general average to each system under neutral environmental conditions in Nile Valley

System of houses	Heat dissipation
Open	30.6±1.1^b
Semi Open	28.1±0.5^c
Close	34.1±0.4^a

Table (3) shows mean ±SE for heat dissipation from house (HDH/°C) and from animal (HDA/°C), respiration rate (RR r/min) and gas emissions (GE/ L, nitrous oxide N_2O/L & Carbon dioxide CO_2/L) affected by type of roof for buffaloes and cows under natural environmental conditions in Nile valley. The highest values were 44.8 of HDH/°C and 35 .00 of RR r/min for asbestos roof and was 42.12 of HDA/°C for mat roof, but the highest values of GE (N2O & CO2/L) were (0.28 & 80.00/L respectively) at sheet roof for buffaloes.

Table 3. Mean ± SE for heat dissipation from house (HDH/°C) and from animal (HDA°C), respiration rate (RR r/min) and gas emissions (GE/L) nitrous oxide (N_2O/L) and Carbon dioxide (CO_2/L) as affected by type of roof for buffaloes and cows under environmental conditions in the Nile valley.

Type of roof	HDH/°C	HDA/°C	RRr/min	GE/L	
				N_2O	CO_2
			Buffaloes		
1	$28.61±0.31^{d}$	$35.65±3.70^{c}$	$20.50±1.89^{d}$	$0.20±0.02^{d}$	$62.00±4.30^{d}$
2	$29.57±0.91^{d}$	$35.84±1.21^{c}$	$23.45±0.58^{c}$	$0.24±0.02^{b}$	$62.00±4.12^{d}$
3	$32.60±0.74^{c}$	$36.66±0.30^{c}$	$25.59±1.11^{c}$	$0.28±0.01^{a}$	$80.00±2.55^{a}$
4	$44.80±0.45^{a}$	$41.25±0.32^{a}$	$35.00±0.22^{a}$	$0.20±0.01^{d}$	$62.00±4.20^{d}$
5	$30.00±0.18^{d}$	$37.14±0.50^{b}$	$19.15±0.68^{d}$	$0.25±0.01^{b}$	$77.50±4.00^{b}$
6	$40.68±0.38^{b}$	$32.32±0.77^{e}$	$29.53±0.65^{b}$	$0.20±0.01^{d}$	$50.33±2.48^{e}$
7	$25.66±0.12^{e}$	$42.12±0.48^{a}$	$13.45±0.22^{f}$	$0.20±0.01^{d}$	$62.00±3.00^{d}$
8	$27.61±0.30^{ed}$	$34.92±1.02^{d}$	$17.09±0.75^{e}$	$0.22±0.01^{c}$	$66.43±3.48^{c}$
			Cows		
1	$28.61±0.31^{c}$	$37.30±0.28^{b}$	$25.12±0.66^{cd}$	$0.18±0.01^{b}$	$45.17±1.56^{d}$
2	$29.57±0.91^{c}$	$36.75±0.46^{b}$	$27.72±0.45^{c}$	$0.17±0.01^{c}$	$52.50±1.78^{b}$
3	$32.60±0.74^{b}$	$38.0±0.75^{b}$	$30.25±0.62^{b}$	$0.17±0.01^{c}$	$49.70±2.29^{c}$
6	$40.68±0.38^{a}$	$30.33±0.52^{c}$	$35.34±1.06^{a}$	$0.18±0.01^{b}$	$48.93±3.33^{c}$
7	$25.66±0.12^{d}$	$40.05±0.75^{a}$	$19.09±0.49^{e}$	$0.18±0.01^{b}$	$47.57±2.49^{c}$
8	$27.61±0.30^{c}$	$37.49±0.82^{b}$	$23.65±0.60^{d}$	0.22±0.02a	$82.68±1.97^{a}$

1: Palm leaves, 2: Wood, Rice Straw and Cottonwood, 3: Sheet metals , 4: Asbestos, 5: Wood and Canvas, 6: Cement, 7: Mat; 8: maize stoke
Mean values for each item with different superscripts in the same column are significantly different ($P \leq 0.05$).

The highest values for cows under cement roof were 40.68/°C (HDH) and 35, 34r/min (RR). But the emission (N_2O and CO_2) were higher values (0.22 & 82.68/L) under maize stoke roof. The animals housing is an excellent technique for reducing heat stress. Under asbestos and cement roof decreased the efficiency of (HDA) by physical channels (convection, conduction and radiation) and increased physiological channels (skin and respiratory system) compared with under mat or maize stoke roof. Asbestos and cement roof housing caused heat load on animals.

Since, the processes of conduction convection and radiation are all dependent on thermal gradient, thus as air temperature rises towards body temperature the thermal gradient is reduced and heat dispersion is less effective, in addition the non-evaporative cooling will shift to evaporative cooling when ambient temperature equal or above body temperature as described by Khalifa (2003) and Omran and Hamdon (2018). The RR a good measures of core temperature and has been used by many investigators to detect the response of animal to the environmental conditions (air temperature & relative humidity).Also the significance of the increase of the respiration rate under heat stress is that it enables the animals to dissipate the excess of body heat by vaporizing more moisture in the expired air, which accounts for about 30 % of the total heat dissipation (Kundu and Bhatnagar, 1980 and Omran *et. al.*2019). Moreover, when the surrounding to (or above) environmental temperature is equal, the animals body temperature, the evaporative cooling (respiration and sweating) system represents the only means of heat dissipation (Mclean, 1963).

The best roof of RR values under mat (13.45&19.09 RR r/min) and maize stoke(17.09 &23.65RR r/min) for two species respectively . Addition to this results celery in table (5) the higher values of milk production for two species were under mat and maize stoke roof (2135&1809/ Kg) and (1732&1718/Kg) respectively.

Table (4) shows mean ±SE for heat dissipation from house (HDH/°C) and from animal (HAD/°C), respiration rate (RR r/min) and gas emissions: nitrous oxide (N_2O/L) and Carbon dioxide ($CO_{2/}$ L)) as affected by type of bedded land under buffaloes and cows under natural environmental conditions in Nile valley. Significant effects of land's type on HDH/°C, HDA/°C, RR r/min and GE values for buffaloes and cows. The highest value was bedded from rice straw (32.83°C) for buffaloes and cows. The lowest was cottonwood only (26.34 °C) for buffaloes. Results found that manure and urine due to decomposed the bedded of rice straw and releasing N_2O was faster than compared with decomposed of cottonwood. The emission gas releasing from decomposed of bedding material effects on environmental condition. Values of GE were higher, in general, from buffaloes compared with cows. Livestock contribute 14.5% of the total annual anthropogenic GHG emissions globally (Gerber *et al.*, 2013). Livestock influence climate through land use change, feed production, animal production, manure, and processing and transport, feed production and manure emit CO_2, nitrous oxide (N_2O), and methane (CH_4), which consequently affects climate change (IPCC 2013).

Table (5) shows mean ± SE for total milk yield (TMY/kg) and lactation period (LP/day), as affected by the type of roof for buffaloes and cows under natural environmental conditions in Nile valley .The highest values of TMY (2135 & 1809/Kg) and LP (225 & 182/day), for buffaloes and cows respectively, were under met and maize stoke roof. While the lowest under asbestos value were (632.5Kg and 133/day) for buffaloes and cement roof for both the values were (950 & 978/Kg) and (170 & 162/day) respectively. Cattle milk production is significantly impaired in hot climates, the decreased in yield and constituents of milk of dairy cattle as a result of exposure to high environmental temperature might be due to the decline in protein, carbohydrate, lipid mineral and vitamin metabolism which leads to a negative balance in nitrogen (Vanjonack and Johnson, 1975, and Kamal *et al*., 1984). High-yielding dairy cows are the most sensitive to the influence of heat at the beginning of lactation and in cases when a body temperature is higher than 39°C a production of milk significantly falls (Ravagnolo and Misztal, 2000). At the outside temperature of 35°C a quantity of milk is decreased by 33 % and at the temperature of 40 °C by 50 % (West, 2003 and Rhoads *et al.*, 2009).

Table 4. Mean ± SE for heat dissipation from house (HDH/ °C) and from animal (HDA /°C), respiration rate (RR r/min) and gas emissions (GE/L) nitrous oxide (N_2O/ L) and Carbon dioxide ($CO_{2/}$ L) as affected by type of bedded for buffaloes and cows under environmental conditions in the Nile valley.

Type of Land	HDH/°C	HDA/°C	RRr/min	G E/L	
				N_2O	CO_2
			Buffaloes		
1	27.00±0.58^{c}	35.34±0.44^{c}	23.12±0.50^{b}	0.23±0.01^{c}	69.75±6.64^{b}
2	32.83±0.74^{a}	40.23±0.31^{a}	28.41±0.61^{a}	0.25±0.01^{a}	77.50±5.86^{a}
3	28.44±0.14^{b}	38.44±0.14$_{b}$	24.86±0.59^{b}	0.24±0.01^{b}	66.82±2.00^{c}
4	26.34±1.16^{c}	36.34±0.60$_{c}$	20.63±1.18^{c}	0.20±0.01^{d}	69.75±1.29^{b}
			Cows		
1	27.00±0.58^{c}	37.20±0.45^{b}	23.21±0.38^{c}	0.10±0.0001^{c}	33.00±0.38^{c}
2	32.83±0.74^{a}	42.78±0.18^{a}	30.69±0.39^{a}	0.18±0.0030^{a}	54.45±1.25^{a}
3	28.44±.0.14^{b}	36.78±0.18^{c}	27.25±0.09^{b}	0.12±0.0010^{b}	35.27±1.29^{b}

1:dirty land , 2: Rice straw, 3: Mixture from Cottonwood and rice straw, 4: Cottonwood only.
Mean values for each item with different superscripts in the same column are significantly different (P ≤ 0.05).

Table 5. Mean ± SE for total milk yield (TMY/kg) and lactation period (LP/day) as affected by type of roof for buffaloes and cows under environmental conditions in the Nile Valley.

Type of roof	Buffaloes			Cows		
	N	TMY	LP	N	TMY	LP
1	8	1333±57.42^{c}	154.0±4.50^{c}	72	1483±319.19^{c}	167.00±46.00^{b}
2	40	1005±56.45^{d}	158±4.28^{c}	16	1084±216.19^{d}	143.34±4.37^{c}
3	-	-	-	40	1055±21.82^{d}	168.89±1.31^{b}
4	4	632.5±30.00^{e}	133±4.23^{d}	-	-	-
5	16	1050±50.00^{d}	175±17.00^{b}	-	-	-
6	40	950.0±117.17^{d}	170±3.78^{b}	52	978±33.9^{e}	162.00±1.6^{b}
7	8	2135±24.57^{a}	225±1.89^{a}	84	1809±251^{a}	182.30±6.39^{a}
8	56	1732±71.13^{b}	211±4.06^{a}	84	1718±213.44^{b}	180.48±5.56^{a}

1: Palm leaves, 2: Wood, Rice Straw and Cottonwood, 3: Sheet metals, 4: Asbestos, 5: Wood and Canvas, 6: Cement, 7: Mat; 8: maize stoke
Mean values for each item with different superscripts in the same column are significantly different (P ≤ 0.05).
(-) non fond diary animal under this model of roof.

Mat and maize stoke roof were the best conditions to increase the production for two species. The values of TMY/kg under mat and maize stoke roof were higher for buffalo (2135Kg) compared with cow (1809/Kg) due to sensitivity of cows to hot conditions.

Table (6) shows mean ± SE for total milk yield (TMY/Kg) and lactation period (LP/ day), as affected as by type of bedded land under buffaloes and cows under natural environmental conditions in Nile valley. found that higher significant between bedded land and milk production and lactation period for buffaloes and cows. The higher values for TMY (1830&1905kg) and LP(210&185/day) on dirt land for two species respectively. Addition to cottonwood for buffalo, (1487/Kg& 163LP/ day) the lowest values were at rice straw (1183&875/Kg) and (179.75&145/day) respectively. The best for animal production and lower the effects of animal on environmental conditions the land under animal without bedded. And cows were more sensitivity to effects of bedded to milk production compared with buffaloes on seam bedded.

Table 6. Mean ± SE for total milk yield (TMY/kg) and lactation period (LP/day) as affected by type of bedded for buffaloes and cows under environmental conditions in the Nile Valley.

Type of roof	Buffaloes			Cows		
	N	TMY	LP	N	TMY	LP
1	80	1830±215.0^{a}	210±11.34^{a}	104	1905±209.4^{a}	185±5.16^{a}
2	72	1183±59.5^{c}	179.75±4.30^{b}	236	875±66.0^{c}	145±1.89^{b}
3	8	1394±59.2^{b}	188.6±4.26^{b}	8	1364±104.4^{b}	171.36±1.96^{a}
4	12	1487±125.5^{b}	163±9.32^{c}	-	-	-

1:dirty land, 2: Rice straw, 3: Mixture from cottonwood and rice straw, 4: cottonwood only.
Mean values for each item with different superscripts in the same column are significantly different (P ≤ 0.05).

Tables (7 & 8) shows Mean squares (MS) and degrees of freedom (df) for heat dissipation from house (HDH/°C) and from animal (HDA/°C) respiration rate (RR r/min) and gas emissions (GE/L) nitrous oxide (N_2O/L), Carbon dioxide (CO_2/L), total milk yield (TMY/Kg) and lactation period (LP) for buffaloes and cows under natural environmental conditions in Nile Valley. Found mostly significant effects ($P \leq 0.001$, $P \leq 0.01$) for (sex of animal, type of roof, type of bedded and classes of THI) of all parameters. Similar trend of interactions between all items studded. Except of the interaction between bedded land and classes of THI was not significant on HDH/°C, N_2O/L, $CO_{2/L}$ and LP/day for buffaloes. Also, the interaction between roof and classes of THI was not significant on GE and between sex of animals and type of bedded on HDH/°C & N2O/L for cows.

Table 7. Mean squares (MS) and degrees of freedom (df) for heat dissipation from house (HDH/ ^{o}C) and from animal (HDA/ °C), respiration rate (RR r/min) and gas emissions (GE/l) nitrous oxide (N_2O/L), Carbon dioxide ($CO_{2/}$ L), total milk yield (TMY/kg) and lactation period (LP/ day) for buffaloes under environmental conditions in the Nile Valley.

Source of variation	df	MS					Df	MS	
		H. HD	A. HD	RR	N_2O	CO_2		TMY	LP
A	2	27.75***	8.90^{ns}	151.44***	0.010*	1716.94***	0	-	-
R	7	88.71***	75.78***	109.92***	0.018***	887.31***	6	1817184.77***	8988.63***
B	3	36.91***	58.07***	20.53**	0.024***	2144.98***	3	520369.36***	1423.67***
T	4	91.12***	523.68***	254.79***	0.048***	926.16**	3	1848070.75***	7662.59***
Interaction									
A*R	1	6.0 ^{ns}	25.79*	81.20***	0.095***	1162.95*	0	-	-
A*B	0	-	-	-	-	-	0	-	-
A*T	1	163.99***	45.13**	49.60***	0.0002^{ns}	19.71^{ns}	0	-	-
R*B	3	18.86***	52.57***	128.76***	0.088***	5567.70***	3	347907.52***	1623.31***
R*T	6	32.05***	97.85***	17.25***	0.080***	3578.29***	6	759643.55***	3515.97***
B*T	2	1.96^{ns}	15.99*	73.06***	0.003^{ns}	495.06^{ns}	2	187694.13***	130.49^{ns}

A: Sex of animal, R: Type of roof, B: Type of bedded land and T: classes of Temperature Humidity Index (THI)

*** : P ≤ 0.05** : P ≤ 0.01 *** : P ≤ 0.001 ns : Not significant (P ≥ 0.05)**

Table 8. Mean squares (MS) and degrees of freedom (df) for heat dissipation from house (HDH/ ^{o}C) and from animal (HDA/ °C), respiration rate (RR r/min) and gas emissions (GE/L) nitrous oxide (N2O/L), Carbon dioxide ($CO_{2/}$L), total milk yield (TMY/kg) and lactation period (LP/day) for cows under environmental conditions in the Nile Valley.

Source of variation	df	MS					Df	MS	
		H. HD	A. HD	RR	N_2O	CO_2		TMY	LP
A	2	44.93***	136.52***	106.09**	0.062***	6304.57***	0	-	-
R	5	72.18***	161.25***	191.18***	0.026***	3385.30***	5	56680360.9***	33283.2***
B	2	28.80**	73.82***	345.82***	0.017**	1371.07**	2	34352561.7***	22070.40***
T	4	76.80***	237.43***	63.85**	0.030***	2137.58***	3	38108270.9***	15734.01***
Interaction									
A*R	5	56.33***	275.89***	73.25**	0.005^{ns}	400.88^{ns}	0	-	-
A*B	2	4.65^{ns}	89.58***	399.38***	0.009^{ns}	5943.96***	0	-	-
A*T	5	79.55***	176.94***	27.48^{ns}	0.020***	871.18***	0	-	-
R*B	5	46.19***	322.57***	110.61***	0.030***	1768.5***	5	58099313.9***	35268.04***
R*T	15	52.90***	109.45***	157.59***	0.014***	1863.57***	10	6031984.7***	5083.03***
B*T	4	50.89***	135.39***	177.50***	0.025***	481.35*	3	7026372.3***	37062.60***

A: Sex of animal, R: Type of roof, B: Type of bedded land and T: classes of Temperature Humidity Index (THI)

*** : P ≤ 0.05** : P ≤ 0.01 *** : P ≤ 0.001 ns : Not significant (P ≥ 0.05)**

CONCLUSION

It could be concluded from this study that the temperature humidity index still the best indicator reflecting physiological statue and productive performance of animal under Egyptian environmental conditions. The semi open System was the lower value of heat dissipation under environmental in Nile valley. The best roofs were mat and maize stoke for two species. Cottonwood good bedded compared with rice straw to reduce emission gas. Dirt land only was good without any bedded this clary from results of RR r/min, heat HDA/°C and GE/L for two species.

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فاعليه انماط الاسكان والاداء الفسيولوجى والانتاجى للجاموس والابقار فى وادى النيل

فايزة إبراهيم عمران ، سيد أحمد محمود و طارق عبد العزيز فودة
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اجريت الدراسه فى وادى النيل (محافظه بنى سويف) تم جمع البيانات شهريا من 7 مراكز بالمحافظه .كانت بدايه التجربه فى شهر ديسمبر 2013 واستمر العمل بها حتى شهر يونيه 2015. الهدف الرئيسى من الدراسه هو دراسه فاعليه انماط الاسقف المختلفه للمساكن على الكفاءه الانتاجيه والفسيولوجيه للجاموس والابقار تحت الظروف البيئيه فى وادى النيل. ودراسه العلاقه بين الفرشه تحت الحيوان والانبعاث الغازى لعمل التعديلات اللازمه لتقليل فاعليه التغيرات المناخيه. تم تسجيل درجه الحراره والرطوبه النسبيه خلال فتره التجربه لحساب دليل الحراره والرطوبه. وكذالك تسجيل الحراره المنبعثه من الحيوان والحراره المنبعثه من المسكن. والكفاءه الانتاجيه للحيوان من خلال كميه اللبن بالكيلو جرام وطول فتره الحليب. والكفائه الفسيولوجيه بحساب معدل التنفس فى الدقيقه, بالاضافه الى تسجيل اكسيد النيتروز المنبعث من الحيوان وحساب ثانى اكسيد الكربون. واظهرت النتائج التالى: ان دليل الحراره والرطوبه هو افضل مقياس يعكس الحاله الفسيولوجيه والانتاجيه تحت الظروف المناخيه المصريه. افضل ماده لعمل الاسقف الحصير ثم البوص على التوالى للجاموس والابقار. حطب القطن كان افضل فرشه للحيوان مقارنه بقش الارز لقله الانبعاث الغازى والحرارى للمسكن وكذالك اقل معدل تنفس. ويفضل الارض بدون فرشه يكون تراب فقط اكد ذالك ايضا الحراره المنبعثه من المسكن ومعدل التنفس والانبعات للجاموس والابقار. كان انتاج اللبن الكلي اعلى تحت الاسقف الحصير والبوص على التوالى. يوجد تأثير معنوى ($P \leq 0.001$) للتداخل بين نوع السقف والفرشه مع جميع النقاط تحت الدراسه. مسكن الحيوان يلعب دور هام فى زياده اوالحفاظ على انتاجيه الحيوان وكذالك البيئه المحيطه. الخلاصه ان تحت الظروف البيئيه فى وادى النيل، لإنتاجيه افضل للحيوان ولتخففيف آثر البيئه علي الحيوان وكذالك اثر الحيوان على البيئه يفضل أن تكون المظله من الحصير اوالبوص والارضيه بدون فرشه (تراب). وافضل نظام تحت هذه الظروف مع التغيرات المناخيه هو النظام المسكن النصف مفتوح.