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## Rectal Temperature, Pulse Rate and Breath Rate in Mules

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### Abstract

Rectal temperature, pulse rate and breath rate were recorded in mules at seven farms located at different places in Pakistan for consecutive 15 days. Rectal temperature (mean  $\pm$  standard error of the mean) was  $99.7 \pm 0.15$  in the morning,  $100.1 \pm 0.14$  in the noon and  $99.8 \pm 0.19$  in the evening. The pulse rate was  $32.3 \pm 1.14$  in the morning,  $34.1 \pm 0.82$  in the noon and  $32.4 \pm 1.02$  in the evening. The breath rate was  $11.7 \pm 0.94$  in the morning,  $13.2 \pm 0.91$  in the noon and  $11.6 \pm 0.86$  in the evening. There was a general tendency of higher rectal temperature, pulse rate and breath rate at noon than at morning or evening at all farms. However, the difference between farms and between various times of the day at any farm was statistically non-significant. Correlation between various parameters are studied. The study shows that mules do not seem to be influenced much by the geoclimate of the area.

**Key words:** Mules, pulse, temperature, breath

### Introduction

Rectal temperature, pulse rate and breath rate in domestic animals constitute important clinical parameters for monitoring health of animals and also for monitoring effect of treatment in various diseases. Body temperature is influenced by metabolic processes (Brock, 1970). It is measured in degree Celsius ( $^{\circ}\text{C}$ ) or Fahrenheit ( $^{\circ}\text{F}$ ) (Hardy *et al.*, 1970). Pulse of an animal can be felt from arteries (Altman and Dittmer, 1971). The uptake of oxygen and release of carbon dioxide is called respiration.

### Materials and Methods

The study was conducted at seven mule farms located in Punjab, NWFP and Azad Kashmir areas having different climatic conditions. At each farm 100 mules were randomly selected. The animals were kept under standard management conditions, were found physically fit on general inspection and did not show any signs of infectious or non-infectious disease clinically.

Rectal temperature, pulse rate and breath rate were recorded in all animals at 07:00 h (morning), 12:00 h (noon) and 19:00 h (evening) for consecutive 15 days during the month of September/October.

Procedures for recording rectal temperature, pulse rate and breath rate were followed as described by Blood and Radostits (1989). Rectal temperature was recorded with the help of clinical thermometer in Fahrenheit degrees ( $^{\circ}\text{F}$ ) by insertion into the rectum of each animal and touching rectum wall for 2 minutes. Pulse rate per minute of each animal was counted by feeling pulse from external maxillary artery with the help of fingers. Breath rate per minute of each animal was determined by counting exhalations on the back of hand.

The data were subjected to statistical analysis using a statistical package 'Minitab' on an IBM-compatible personal computer.

### Results

**Rectal temperature:** The rectal temperature (mean  $\pm$  standard error of the mean) in mules is shown in Table 1. It was  $99.7 \pm 0.15$  in the morning,  $100.1 \pm 0.14$  in the noon and  $99.8 \pm 0.19$  in the evening. Morning temperature ranged from  $99.1 \pm 100.2$ , noon temperature ranged from  $99.5$  to  $100.5$  and evening temperature ranged from  $99.5$  to  $100.3$ . Statistical analysis revealed non-significant difference in rectal temperature of mules at various times of the day and also between various farms. However, there was a general tendency of higher rectal temperature at noon than at morning or evening at all farms.

There was a significant positive correlation between morning and noon temperatures ( $r = 0.969$ ,  $p < 0.001$ ), between morning and evening temperatures ( $r = 0.979$ ,  $p < 0.001$ ) and between noon and evening temperatures ( $r = 0.922$ ,  $p < 0.001$ ).

**Pulse rate:** The pulse rate (mean  $\pm$  standard error of the mean) in mules is shown in Table 2. It was  $32.3 \pm 1.14$  in the morning,  $34.1 \pm 0.82$  in the noon and  $32.4 \pm 1.02$  in the evening. Morning pulse rate ranged from  $29.8$  to  $36.6$ , noon pulse rate ranged from  $31.8$  to  $36.8$  and evening pulse rate ranged from  $29.4$  to  $36.5$ . There was a general tendency of higher pulse rate at noon than at morning or evening at all farms. However, statistical analysis showed that the difference between farms and the three times of the day at any farm was non-significant.

There was a significant positive correlation between morning and noon pulse rate ( $r = 0.939$ ,  $p < 0.001$ ), between morning and evening pulse rates ( $r = 0.968$ ,  $p < 0.001$ ) and between noon and evening pulse rates ( $r = 0.927$ ,  $p < 0.001$ ).

**Respiration rate:** The respiration rate (mean  $\pm$  standard error of the mean) in mules shown in Table 3. It was  $11.7 \pm 0.94$  in the morning,  $13.2 \pm 0.91$  in the noon and

11.6±0.86 in the evening. Morning respiration rate ranged from 8.0 to 14.7, noon respiration rate ranged from 9.8 to 16.3 and evening respiration rate ranged from 8.3 to 14.9. There was a general tendency of higher respiration rate at noon than at morning or evening at all farms. However, the difference between farms and between various times of the day at any farm was statistically non-significant.

There was a significant positive correlation between morning and noon respiration rates ( $r = 0.99$ ,  $p < 0.001$ ), between morning and evening respiration rates ( $r = 0.968$ ,  $p < 0.001$ ) and between noon and evening respiration rates ( $r = 0.947$ ,  $p < 0.001$ ).

Table 1: Rectal temperature (°F) in mules at various farms in Pakistan

Farms	Morning	Noon	Evening
Punjab - 1	99.5	99.9	99.5
Punjab - 2	99.8	100.1	99.5
Mansehra - 1	99.7	100.2	99.7
Mansehra - 2	99.1	99.5	98.8
Azad Kashmir - 1	100.2	100.5	100.3
Azad Kashmir - 2	99.7	99.9	99.6
Azad Kashmir - 3	100.2	100.5	100.3
Mean ±	99.7	100.1	99.8
Standard error	±0.15	±0.14	±0.19

Each figure represents mean of 100 mules at each farm.

Analysis of variance				
SOV	df	SS	MS	F
Time of the day	2	3.88	1.94	-3.66
Locality	6	3.16	0.52	-0.98
Error	12	-6.37	-0.53	
Total	20			

Table 2: Pulse rate (per minute) in mules at various farms in Pakistan

Farms	Morning	Noon	Evening
Punjab - 1	34.2	36.1	33.9
Punjab - 2	36.6	36.8	36.5
Mansehra - 1	29.8	31.8	30.5
Mansehra - 2	29.9	32.9	29.4
Azad Kashmir - 1	30.9	32.9	30.5
Azad Kashmir - 2	35.3	36.1	35.0
Azad Kashmir - 3	31.5	32.0	31.0
Mean ±	32.3	34.1	32.4
Standard error	±1.14	±0.82	±1.02

Each figure represents mean of 100 mules at each farm.

Analysis of variance				
SOV	df	SS	MS	F
Time of the day	2	13.53	6.76	-0.36
Locality	6	130.81	21.8	-1.18
Error	12	-221.54	18.46	
Total	20			

Correlation between rectal temperature, pulse rate and breath rate. There was a poor correlation between morning rectal temperature and morning pulse rate ( $r = -1.01$ ), between morning rectal temperature and morning respiration rate ( $r = 0.291$ ), between noon rectal temperature and noon pulse rate ( $r = -0.353$ ), between noon rectal temperature and noon respiration rate ( $r = 1.401$ ), between evening rectal temperature and evening pulse rate ( $r = 0.209$ ), between evening rectal temperature and evening respiration rate ( $r = 0.065$ ) and between evening pulse rate and evening respiration rate ( $r = 0.397$ ).

Table 3: Respiration rate (per minute) in mules at various farms in Pakistan

Farms	Morning	Noon	Evening
Punjab - 1	14.7	16.3	14.1
Punjab - 2	14.6	15.8	14.9
Mansehra - 1	10.1	11.8	10.5
Mansehra - 2	10.5	12.3	10.4
Azad Kashmir - 1	13.0	14.4	11.7
Azad Kashmir - 2	8.0	9.8	8.3
Azad Kashmir - 3	10.9	11.7	11.3
Mean ±	11.7	13.2	11.6
Standard error	±0.94	±0.91	±0.86

Each figure represents mean of 100 mules at each farm

Analysis of variance				
SOV	df	SS	MS	F
Time of the day	2	10.37	5.18	-0.26
Locality	6	142.02	23.07	-1.23
Error	12	-231.18	-19.26	
Total	20			

## Discussion

Clinical parameters like rectal temperature, pulse rate and respiration rate are very useful indicators of health in Livestock. Many conditions are capable of causing variations in these clinical parameters of animals. Extensive information on these aspects is available in horses but information is scarce in mules. Seven farms situated at different places were included in the study to envisage influence of geoclimatic factors on the clinical parameters. Rectal temperature is an index of deep body temperature (Swenson, 1977). Variations related to the time of the day are designate "diurnal variations". The extent of such temperature changes varies in different species. In general, in animals that are active during daytime, maximum temperature are usually found in early afternoon and minimum early in the morning. The usual diurnal temperature variation in the donkey during the summer was found to be between 34.6 and 38.4°C. Rectal temperature in mules in the present study is comparable to that of its parents i.e., horses and donkeys. Swenson (1977) reported rectal temperature of 99.7°F (range 99-100.6°F) in males horses, 100°F (range 99.1-100.8°F) in females horses and 99.3°F (range 97.5-101.1°F) in donkeys. However, heart beat in mules appears lesser than reported in horses (average 44, range 23-70 per minute) and less than (average 50, range 40-56 per minute) by Swenson (1977). Respiration includes all those chemical and physical processes by which an organism exchanges gases with its environment. Respiration rate in mules in the present study (11.7 per minute) is also comparable to that reported in horses (12 per minute) by Swenson (1977).

Statistical analysis on data shown in Tables 1-3 revealed non-significant differences in clinical parameters in mules kept at various places in Pakistan. Ambient temperature, geoclimate and altitude vary considerably between Punjab and NWFP and Azad Kashmir. The lack of significant difference in clinical parameters in mules kept at different places indicates that the geoclimate of the area did not influence these parameters. Thus suggests that mules have a considerable physiological tolerance to weather and can adapt to various climate conditions relatively easily,

Table 4: Correlation between various parameters

	1	2	3	4	5	6	7	8
2.	0.969							
3.	0.979	0.922						
4.	0.010	-0.173	0.145					
5.	-0.211	-0.353	-0.053	0.939				
6.	0.041	-0.091	0.209	0.968	0.927			
7.	0.115	0.168	0.081	0.291	0.361	0.297		
8.	0.008	0.065	-0.017	0.285	0.401	0.300	0.990	
9.	0.086	0.142	0.065	0.383	0.403	0.397	0.968	0.942

- |                               |                            |                               |
|-------------------------------|----------------------------|-------------------------------|
| 1. Morning rectal temperature | 2. Noon rectal temperature | 3. Evening rectal temperature |
| 4. Morning pulse rate         | 5. Noon pulse rate         | 6. Evening pulse rate         |
| 7. Morning respiration rate   | 8. Noon respiration rate   | 9. Evening respiration rate   |

*A. priori*, sudden transport of mules from one climate to another may not tax health of the animal due to difference in climate. This is further augmented by any lack of significant correlation between rectal temperature, pulse rate and respiration rate (Table 4). In conclusion, mules is a physiologically stable animal for various geoclimates.

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