YYÜ VET FAK DERG
(2007), 18(1):115-116 **DERLEME**

THE PHYSICAL THERMOREGULATION OF BUFFALOES

Aliyev Mirza MIKAİLOĞLU
Azerbaijan State Agricultural Academy

The heat nascent in an organism gets to a skin cover by thermal conductivity of tissues and at the expense of heat transport by heated blood. From the surface of the body the heat is reflected into the environment by means of emanation, convection, conduction and bleeding. An organism gives up the heat by different ways (6,2).

The greater part of it deposits through the skin. Besides, the heat is consumed for heating of breathing air and moisture bleeding from breathing organs, heating of eaten fodder and drunken water, it deposits with urine and feces. It is important to determine a share of collaboration of each from specified forms of heat efficiency in common balance of heat emission in the experiment. In addition, it is necessary to clear up some factors of the air environment, how and how much it influences on character and direction of heat emission of buffaloes. It is showed that age, live weight and production, season, regime of feeding and other factors exert definite influence on buffalo's thermoregulation (3, 4, 5, 6).

It is necessary to stress that environment factors, particularly, components of microclimate that surround animals exert a water-tight strong influence on an organism of animal, its thermoregulation, particularly, on physical thermoregulation. In this context the buffaloes are unique animals, harshly differ by physical thermoregulation from other domestic animals, including cattle. Among the components of microclimate, the air temperature has basis importance for thermoregulation, particularly, for the heat emission (1,6,8).

We have elaborated this question in several aspects: in the first place, in connection with the animal's age. The heat that formed in an organism disperses by force of bleeding, convection, beaming and other ways. The study of influence of the air temperature on heat output by moisture bleeding through lungs and skin of buffaloes showed that summary quantity of the heat emission by bleeding through lungs and skin increases with rise in temperature of air. And the heat emission by heating breathing air, convection, radiation and other ways decreases with the increasing of air temperature. So, the heat emission (%) by convection, radiation and other ways changed with age of buffaloes and formed as follows: little buffaloes up to monthly age with temperature 10°C - 70%, with 27°C - 66%; the little buffaloes of one-three months of age with temperature 11°C - 67,9%, with 20-27°C - 65,5%; young animals upwards six months with air temperature 10-12°C - 67%, and with 24-27°C -64,6%. Grown-up animals with air temperature 9-10°C - 66,5%, with 27°C -63% (2, 3, 6, 7).

The results of experimental dates of study of the heat emission by beaming of grown-up buffaloes show that it changes according to air temperature and its humidity. It decreases with the rise of air temperature, and increases with the rise of relative humidity. The heat emission of beaming of the grown-up buffaloes according to air temperature totals: 48,58% by air temperature of 9-10°C, 36,52% by air temperature of 15-l9 °C, and 20,38% of heat output of 27°C (1, 6, 8).

The convection represents the way of transmission of the heat into surrounding layer of air that forms constantly changing heated air covering animal's body. The air transmission of heat by conducting is observed in immovable air with temperature that is lower than the temperature of animal's skin. In view of air in placement for animals that is always in movement, the convection has the main significance in heat emission through the air (1, 3, 6).

The results of experimental dates of the study of heat emission by the convection of grown-up buffaloes show that there are direct relationships between the speed of air movement and heat emission. The heat emission by convection increases with the rise of the speed of air movement.

The experimental dates show that the heat emission by the convection depends not only on the speed of air movement but also on air temperature. Heat emission is 20,2% at 9-10°C. It is 18,3% if temperature is higher than 27° C and 18,3% if temperature is higher than 15-16°C (2, 6, 7, 8).

The heat emission by convection of the grown-up buffaloes with the air temperature of 9-10 °C, relative humidity of 89,5% and the speed of the air movement of 0,1 m/sec totaled as 17,99%; with the air temperature of 17-18 C, the relative humidity of 84,3% and the speed of air movement of 1,0 m/sec totaled as -30,27% from the heat output. The heat emission of the grown-up buffaloes increased with the rise of air temperature. It totaled 28,45% with the air temperature of 9-10°C, 30,56% with the air temperature of 15-19 ^{0}C, 36,41% with the air temperature of 27°C. The specific weights of the individual types of the heat emission with the air temperature of 13-18°C that is neutral thermal zone, total: 41,65% by the beaming of 33,47%, 19.79% by convection of 18,90, 31,72% by bleeding of 31,33, 6,84% by the others of 16,3 (1, 4, 5).

The individual types of the heat emission with temperature of 9-10° C total 48,58% of beaming 17,99% of convection, 28,43% of bleeding**,** 5% of conducting and by other ways, and there is 20,38% of beaming, 30,27% of convection, 35,41% of bleeding, 13,83% of conducting and other ways with the temperature of 27°C. The heat emission by conducting and other ways with the rise of the air temperature increases and totals 13,83% with the temperature of 27°C. It is evident that the heat emission by convection and beaming with the rise of air temperature over 27 C greatly decreases (2, 3, 6).

In spite of the increase of diet heat emission by the bleeding up to 36%, the excess of heat that can leak mainly by the way of the conducting (bathing, dousing, etc). The intension of the heat emission by convection and reaction definites mainly by the difference between the skin temperature and the environment**.** Therefore we certainly must know the temperature of these parts of skin for the fullness of the representation of the mechanism of skin heat emission and specific concern of the individual skin parts in this process. The experiments showed that different parts of buffalo's skin have different activities of temperature (4, 7, 8).

The maximal temperature of buffalo's skin checked out in inguen in some parts in the range from 35,53 till 37,18°C; the minimal one is on finitudes from 19,00 till 30,20°C. The mean temperature of buffalo's skin totaled 28,1° C with the air temperature of 15-16°C, 35,15°C with the air temperature of 2/C (5,6).

The level of temperature of different topographic skin parts significantly depends on microclimate, particularly, air temperature**.** The temperature of skin increases with the increase in air temperature. It is necessary to note that the changes of microclimate turn out most on the temperature of skin of the open places (3,4).

References

1. Adballa, E.B., Kotby, E.A., Johnson, H.D., 1993. Physiological responses to heat-induced hypothermia of pregnant and lactating ewes. Small Rumin. Res. 11, 125–134.

2. Albright, J.L., Alliston, C.W., 1972. Effects of varying theenvironment upon performance of dairy cattle. J. Anim. Sci. 32, 566–577.

3. Allen, T.E., 1962. Responses of Zebu, Jersey and Zebu and Jersey crossbred heifers to rising temperatures with particular reference to sweating. Aust. J. Agric. Res. 13, 165–179.

4. Berman, A., 1971. Thermoregulation in intensely lactating cows in near-natural conditions. J. Physiol. Lond. 215, 477–481.

5. Bianca, W., 1968. Thermoregulation. In: Hafez, E.S.E. (Ed.), Adaptation of Domestic Animals. Lea and Febiger, Philadelphia, PA, pp. 97–118, Chapter 7.

6. Bölükbaşı F, 1989, Fizyoloji ders kitabı (vücut ısısı ve sindirim), A.Ü. Vet Fak. Yayınları 413, Ankara.

7. R. L. Korthals, Y. R. Chen, Z G. L. Hahn and R. A. Eigenberg, 1997 Calculation of Fractal Dimension From Cattle Thermoregulatory Responses, J. Therm. Biol., 22 (4/S), 285-293, 1997

8. Silanikove N, 2000, Effects of heat stress on the welfare of extensively managed domestic ruminants, Livestock Production Science, 67 (2000): 1–18