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Potential for higher milk production of indigenous cows under heat stress conditions

Dr. ANJALI AGGARWAL*

Principal Scientist, Animal Physiology Division, ICAR-National Dairy Research Institute, Karnal - 132 001 (Haryana), E-mail : anjaliaggarwal23aa@gmail.com

Challenges faced by livestock are numerous, but heat stress is one of the major challenges that dairy animals have to deal with during the year. Global warming could result in adversely impacting the overall output in the coming years. It has been estimated that climate change will lead to decline in milk production by over 3 million tonnes (MT) per year by 2020. High ambient temperatures outside the thermo-neutral zone cause significant changes in physiological processes due to the direct effects of heat stress. Indigenous breeds are less prone to physiological breakdown because of environmental stress. Although their potential for production is lower than that of temperate breeds when compared in more favorable production environments. Milk production of high producing European cows, crossbreds and buffaloes is reduced when the Temperature Humidity Index (THI) exceeds 75. The problem of heat stress is increasing because increases in milk yield result in greater metabolicheat production and because of anticipated changes in the globalclimate. Most of places in India observe THI > 75 and more than 85% places in India experience moderate to high heat stress during the months of April, May and June and THI range of 75 to 85 at 2.00 PM. Indigenous breeds are known for heat tolerance and ability to survive and perform even under stressful conditions and low input regimes. Most of the indigenous cattle can tolerate atmospheric temperatures of 40°C without significant decline in milk production. The extensive area covered by the dewlap, loose body skin, more sweat glands and hair coat play a vital role in its heat tolerance. The Indigenous breeds of cattle generally have more number of bigger, functional, sweat glands per unit area of the skin which helps them to survive under higher temperature. They have highest cutaneous and lowest respiratory heat loss (panting is less). Indigenous cattle possess natural resistance to various insects, as their skin has a dense texture, making it difficult for blood sucking insects to penetrate. Flexible tail tip helps as a brush to repel vectors.

Indigenous cattle have the ability to convert low protein, high fiber roughage materials into high-grade foodstuffs with the aid of omasal symbionts, so thrive and performs well on inferior fodders. They are efficient forager and their tight sheath and small teats avoid injuries during grazing. Indigenous cattle have highest ability to self-preserve and longevity is more than 15 years, while many cows survive upto 20 years with high reproduction rates and more number of lifetime calves and may give even 15 calves in their life time. They calve with ease compared to crossbred/exotic and dystokia is rare. There is a great degree of genetic variation in indigenous breeds with respect to their size, productivity, growth rate, reproductive efficiency which can be made use for the cattle worldwide. Indigenous cows are acclimatized according to climate. They produce lesser amount of carbon dioxide, methane, carbon monoxide and ammonia after digestion of feed and fodder. Challenge is to make the local breeds economically viable and sustainable under the changing situations. Though crossbreeds have the high genetic potential of milk production, they are unable to express fully in many situations due to environmental stress (low quality feed and fodder and high susceptibility to diseases). With the introduction of exotic breeds, many new diseases also emerged. The increased use of modern techniques in animal production without desired level of veterinary health care and feed and fodder resources have resulted in sub optimal performance of crossbreds. With improved care and management one can increase milk production in indigenous cattle substantially. Despite of adversities many local breeds continue to survive, support and sustain the rural economy. Expenditure on their health care and management is minimal and possible with locally available resources. Low productivity of Indian breeds can be changed over a period of time, by improving the green fodder availability and breeding with pedigree Bulls. Embryo transfer and artificial insemination in controlled manner can also be helpful. By making green fodder available throughout the year a minimum 20% increase of milk production can be achieved. The indigenous breeds of cows are not only best suited to fight the impact of global warming but these are also known to produce protein-rich (A2 type) milk which protects from various chronic health problems.

***Dr. Anjali Aggarwal** is a distinguished Animal Physiologist. With her basic training in Animal Physiology, Dr. Anjali Aggarwal, joined the Agricultural Research Service in India in 1991. The area of research work is Stress and Environmental Physiology. She has more than 60 publications in national and international Journals, authored a book on “Heat stress and Animal Productivity”, three technical bulletins, four manuals and many book chapters. She has guided 8 MVSc and 6 PhD students. In her early carrier she conducted the research investigating Draught animal power evaluation, fatigue assessment, work-rest cycle and work limiting factors, studies on partitioning of heat loss from skin and pulmonary system of cattle and buffaloes, electrocardiographic studies in cattle and buffalo. She subsequently worked to explore microclimatic modification for alleviation of heat and cold stress in cows and buffaloes, supplementing micronutrients during dry period and early lactation to crossbred and indigenous cows for improved health and productivity. Over last few years she has taken up work on the mechanism whereby heat stress affects immune status in transition buffaloes, apoptosis related genes as affected by heat stress in transition cows and mRNA expression of stress related genes in both sahiwal and KF cows during transition period. Received many best poster awards and for writing bulletins and pamphlets. She is fellow of National Academy of Dairy Science, Life Member of Society of Animal Physiologists of India, Animal Nutrition Society of India, Agricultural Research Services Scientists Forum, Bhartiya Krishi Anusandhan Samiti.