

**EFFECT OF STRESS ON FARM ANIMALS**

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**S**tress can be defined as the sum of all physiological and behavioural changes in animals in response to physical, emotional or mental stimuli. Generally, it is used in a negative sense and described as harmful effects of several factors on the health and productivity of animals. Stress disturbs the normal physiology or homeostasis of the animal. The Humane Slaughter Association, UK has described stress as

S= Situations

T= That

R= Release

E= Emergency

S= Signal for

S= Survival

In a condition of stress animal always tries to regain the normal condition. Therefore, a stressor is an internal or external stimulus that evokes physiological responses in the body to re-establish homeostasis. A stressor can be a biological agent, chemical compound or environmental condition. As the stress has detrimental consequences in animal, it should be removed for the benefit of the animal. In this article, we have discussed the different stress conditions and how they affect the animal.

### Type of stressors and biological response to them

As discussed above, there can be several types of stressors. It can be internal or external. It can also be classified as biotic and abiotic.

Biotic stresses are caused by living organisms. These include

- Bacteria
- Virus
- Fungus
- Mycoplasma
- Insects
- Parasites etc.

The abiotic stressors mainly include-

- Cold stress
- Heat stress
- Poor housing
- Social stress etc

The different types of stressors and their effect in the physiological system are presented below (Table 1)

Table 1: Type of stressors and biological response to them

Stressor	Symptom	Physiological system activated or inhibited
Heat	Elevated body temperature	Heat loss mechanism increased, decreased phagic drive
Cold	Reduced body temperature	Heat gain mechanism enhanced, heat loss mechanism reduced, food intake enhanced
Infection	Elevated body temperature	Immune system activated; hypothalamic body temperature set point altered
Poor housing	Increased lameness	HPA axis activated
Poor nutrition	Deficiency symptoms	Mobilization of the nutrient reserve, altered behavior
Social	Altered behavior	Food intake reduced, HPA axis activated

## Effect of stress on production

The major consequence of any types of stress in an animal is loss of production. The animal has to spend energy to reduce the effect of stress. It results in production loss. The mechanism is described below with a diagram (Fig 1).

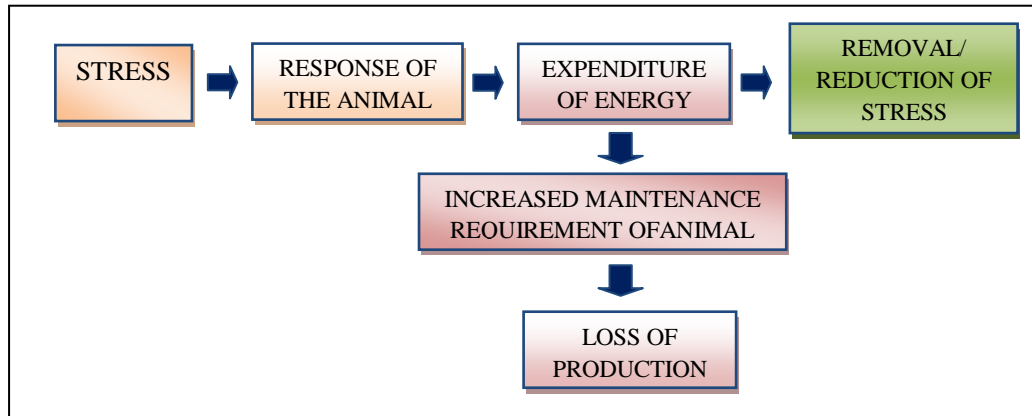


Fig 1: Consequences of stress resulting loss of production in animal

## Consequences of different physiological and environmental stress on the animal

### A. Pregnancy and parturition

Pregnancy causes prominent physiological stress in farm animals. In the case of cattle, during the first six months of gestation, the metabolic energy requirement increases upto 16%. In the last trimester, this energy demand increases to 175% compared to non-pregnant cows. On the day of calving, the rumen contractility decreases and simultaneously the feed intake also. It has been observed that there is a rise in serum cortisol also at that time. So, it is utmost important to provide good nutrition and management throughout the pregnancy and at the time of parturition. It will ensure the birth of a healthy calf and its good productivity later.

### B. Lactation

Lactation imposes huge metabolic stress in animals. The energy demand is very high to maintain milk production. Often, the animal shows a negative energy balance. The heat production becomes nearly twice due to increase in several metabolically active organs. The increase in organ size during lactation is presented below (Table 2).

The dry matter intake (DMI) also increases rapidly after parturition. It becomes nearly double at two weeks post-partum and triples at three weeks postpartum. It reaches a maximum value at three months in cattle.

Table 2: Increase in organ size/function during lactation

Organ size/Function during Lactation	Increase (%)
Mammary gland	73%
Liver, Heart, Lung	22-25%
Metabolic demand of Liver	25%
Digestive tract mass	29%
Energy expenditure	28%

### C. Environmental cold exposure

During the cold seasons, the energy expenditure increases to produce more metabolic heat. Simultaneously, feed intake also increases. The decrease in environmental temperature hampers milk production. This effect is more prominent in Jersey cows compared to Holstein. It may be due to the smaller body size of the Jersey resulting more surface area. The level of thyroxin hormones also increases with decrease in temperature. Interestingly, the high producing cows don't show much increase in thyroxine level as it produces more metabolic heat due to milk production. If the animals are not allowed to take more feed during cold stress, it will increase the thyroxine level to enhance the metabolic rate.

### D. Heat exposure

High producing cows are more sensitive to heat stress. During the hot seasons, the animals reduce their feed intake in order to decrease the heat production of digestion and metabolism. But, this decreased feed intake results in decreased milk production. If a comfortable environment is provided to the lactating animals, milk production will be unaffected. The installation of the fan-cum-mist system in big farms can help.

### Immune function in stress

The immunity is suppressed and the animals become more susceptible to disease at stressful conditions. Stress activates the HPA (Hypothalamic pituitary adrenal) axis. It results in the secretion of cortisol which is an immuno-depressant. The activity of reactive oxygen species increases at heat stress and causes cell damage. It has been observed that weaning stress can cause digestive problems. So, it is essential to take care of the animals in any stress conditions to protect them from other diseases.

## Effect of stress on reproduction

Stress has a negative impact on all the reproductive parameters including semen quality, sexual behavior, fertility rate, follicular dynamics etc. In dairy bulls, semen volume, sperm concentration, sperm motility and sperm survival decreases during summer seasons. Prolonged heat exposure to animals can decrease the rate of fertilization and inhibit embryonic development. In cows, lengthened estrous cycles, shortened estrus duration and decreased estrus intensity can be observed in hot seasons. The mating behavior is altered and the endocrinological balance is also disturbed.

## Conclusion

It is very clear that stress is a threat to the animals. It disturbs the homeostasis, affects the health and reduces the production. There are several internal and external stressors and have a negative impact on animals. So, it is utmost important to reduce these stress and provide a comfortable environment. It will ensure good health and better productivity from the animal and economic stability to the farmer.

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