CHAPTER 15

OBJECTIVES

At the end of this chapter, students should be able to:

â—† explain the meaning of environmental physiology.

â—† state the effects of changes in climate on growth, reproduction, milk production, egg production

15.1 Introduction

Animals and crops perform optimally when environmental factors such as those relating to soil, shape and condition of the land and the climatic factors like rainfall, temperature, wind and relative humidity are optimum. A deviation from the normal condition causes problems for the organisms. Animals are particularly sensitive to environmental changes as it affects production system negatively. Apart from the direct effects of weather on animal production, environmental changes affect the crops on which the animals feed.

15.2 Meaning of Environmental Physiology

It refers to the effects of the environment on the growth and performance of farm animals. Farm animals perform well when climatic factors are optimum.

15.3 Effects of Changes in Climate on Growth of Farm Animals

Growth of farm animals is adversely affected when there are changes or fluctuation in the prevailing climatic factors of the area. Too high or too low of any of the elements of weather causes negative effects as listed below.

1. Extremely low temperature leads to retarded growth or even death.

2. Extremely high temperature causes chicks to pant. Temperature of 39 Â°C favours proper development of chicks.

3. In low temperature mortality of birds increases through huddling and suffocation.

4. High temperature reduces feed intake in poultry.

5. At low temperature, there is reduced feed conversion effi ciency.

6. High relative humidity affects food intake of farm animals.

7. High relative humidity causes mouldiness of feed in poultry houses, leading to low feed intake and retarded growth.

8. High intensity of radiation affects food intake of farm animals.

9. Wind aids the spread of diseases (airborne diseases, e.g., tuberculosis) which causes retarded growth or even death of farm animals.

10. High rainfall leads to multiplication of tsetse flies which transmit trypanosomiasis. This reduces growth or may even lead to death of the farm animals.
11. Moderate wind velocity brings about good ventilation which eventually enhances normal growth of farm animals.
12. Heat stress results from high temperature in farm animals like cattle, poultry and pig.

15.4 Effects of Changes in Climate on Reproduction

1. High temperature leads to low rate of conception or fertilisation in farm animals.
2. Heat stress causes abortion in farm animals.
3. High intensity of radiation causes heat stress in farm animals, thereby reducing reproductive capabilities.
4. High temperature increases the frequency of mating, the quality and quantity of semen in breeder.
5. Fertility and hatchability of eggs in poultry decrease at a high temperature.
6. Ovulation in farm animals also decreases with increase in the environmental temperature.
7. High rainfall and high relative humidity cause chilling of young ones after parturition.
8. Heat periods in farm animals are adversely affected by high temperature, leading to low reproductive capability.
9. In poultry, sexual maturity is controlled by light intensity. For example, low light intensity is desirable during rearing of pullets to prevent early sexual maturity.

15.5 Effects of Changes in Climate on Milk Production

Apart from the effects of changes in climate on growth and reproduction, milk production in farm animals is also affected. Some of these effects are
1. Reduction in milk production of farm animals as a result of high intensity of radiation.
2. High relative humidity favours the growth of disease pathogens that can reduce milk production in farm animals.
3. High temperature and rainfall do not favour the rearing of dairy animals.
4. Extremes of rainfall do not favour the growth of grasses, leading to low feed intake and subsequent low milk production in farm animals.
5. Tsetse fly growth is favoured by high rainfall, thus increasing transmission of trypanosomiasis which reduces milk production in farm animals.

15.6 Effects of Changes in Climate on Egg Production

Egg production in poultry birds is sensitive to changes in climatic factors such as temperature, light and relative humidity. Some of the effects are
(a) High temperature reduces spermatogenesis and libido in males.
(b) High temperature lowers egg production.
(c) High temperature reduces egg storage period.
(d) Hatchability of eggs is reduced at a high temperature.
(e) Water intake increases with high temperature and decreases with decrease in temperature.
(f) Feed intake is reduced with increasing temperature and this leads to lower and small-sized egg production.
(g) High humidity aggravates heat stress, thereby reducing egg production.
(h) Humidity is very important in incubation of eggs.
(i) Light is an important factor in egg production as it controls egg-laying in hens.

(j) Duration of lighting controls time spent at feeding which regulates growth and the rate of feathering.
(k) Direct light of high intensity causes stress to the eyes of farm animals.
â—† Animals and crops perform optimally when environmental factors such as those relating to soil, shape and condition of the land and the climatic factors like rainfall, temperature, wind and relative humidity are optimum.
â—† Animals are particularly sensitive to environmental changes as it affects production system negatively.
âœ§ Environmental physiology refers to the effects of the environment on the growth and performance of farm animals.

Activity

Visit a nearby poultry and identify the environmental factors that are likely to affect egg production. List ways by which the farmer can overcome some of the environmental problems with respect to housing, sanitation and health care management.

SUMMARY

Animals and crops perform optimally when environmental factors such as those relating to soil, shape and condition of the land and the climatic factors like rainfall, temperature, wind and relative humidity are optimum.
â—† Animals are particularly sensitive to environmental changes as it affects production system negatively.
âœ§ Environmental physiology refers to the effects of the environment on the growth and performance of farm animals. on
âœ§ Growth of farm animals is adversely affected when there are changes or fluctuation in the prevailing climatic factors of the area.
âœ§ Too high or too low of any of the elements of weather causes negative effects such as retarded growth or even death.
âœ§ Temperature of 39 Â°C favours proper development of chicks.
â—† High temperature increases mortality of birds but reduces feed intake in poultry.
â—† High relative humidity affects food intake of farm animals and causes mouldiness of feed in poultry houses. High intensity of radiation affects food intake of farm animals.
â—† Wind aids the spread of diseases which cause retarded growth or even death of farm animals.
â—† High rainfall leads to multiplication of tsetse flies which transmit trypanosomiasis.
â—† High temperature leads to low rate of conception or fertilisation in farm animals.

Revision Questions

Essay Questions

1. State five effects of climate change on animal reproduction.
2. State six effects of climate change on milk production.
3. State five effects of climate change on egg production.

Objective Questions

1. Animals perform optimally when climatic factors such as those relating to the following are optimum except
(a) rainfall.

(b) temperature.
(c) fan.
(d) relative humidity.

2. The effects of the environment on the growth and performance of farm animals is described as
(a) environmental physiology.
(b) environmental entomology.
(c) environmental morphology.
(d) environmental toxicology.

3. The effects of temperature is shown in the following ways except
(a) low temperature increases mortality of birds via huddling and suffocation.
(b) low temperature causes increased feed conversion effi ciency of animal.
(c) temperature of 39 Â°C favours proper development of chicks.
(d) extremely high temperature causes chicks to pant.

4. Heat stress results from high temperature in farm animals like
(a) cattle.
(b) pig.
(c) fish.
(d) poultry.

5. The following are effects of high temperature on farm animals except
(a) high temperature reduces spermatogenesis and libido in males.
(b) high temperature increases egg production.
(c) high temperature reduces egg storage period.
(d) feed intake is reduced with increasing temperature and this leads to lower and small-sized egg production.

Answers to Objective Questions

1. c 2. a 3. b 4. b 5. b