

Lecture 1

ANIMAL DISTRIBUTION

No animal species occurs uniformly over the whole world, but each is restricted to a definite RANGE or AREA OF DISTRIBUTION. The entire land or water over which a species may occur is termed its GEOGRAPHICAL RANGE and the kind of environment in which it lives is its ECOLOGICAL RANGE. All the animal livings in a particular area, large or small are collectively termed the FAUNA (the equivalent term for plant is Flora). The plants and animals together are the BIOTA.

FACTORS REGULATING DISTRIBUTION

Since every species produces offspring in excess of the numbers that can survive within its normal range, there is a population pressure by which individual tend to expand the boundaries of their range. Factors which acts to reduce population distribution are competition, enemies, disease, shortage of food, adverse seasonal weather conditions and decrease in available shelter. The distribution of all animals, from protozoa to mankind is consequently dynamic rather than static and always subject to changes. This is equally true of plants on which so many animals depend. Most plants, being rooted to the ground, cannot extend their range as individuals but only by dispersal of seeds.

The external factors that limit distribution are termed barriers. These include

- a. Physical barriers- such as land for aquatic species and water for most terrestrial forms;
- b. Climatic barriers- such as temperature (average, seasonal or extreme), moisture (as rain, snow, air humidity or soil moisture), amount of sunlight etc.
- c. Biological barriers- such as absence of appropriate food or presence of effective competitors, enemies or disease. Many kinds of animals and insects are limited to particular species of plants for their food, shelter or breeding places, so that their distribution is controlled by factors that regulate these plants.
- d. Every species of animal and plant has a limit of tolerance- maximum or minimum-to each factor in its environment. Changes in a factor beyond the tolerance units in migration or death, or survival of only those individuals better (more tolerant) to the altered conditions.

BEEF CATTLE POPULATION AND DISTRIBUTION

There are over 1.1 billion cattle in the world, many of which are used for work or milk production with beef production only a side issue of their major intended usefulness.

All dairy cattle are beef cattle but not all beef cattle are dairy cattle. Most of the cattle produced strictly for beef are found in North and South America, Australia and New Zealand. The distribution of the World cattle population is such that the leading beef producing countries are not necessarily the highest beef consumers per capital. In fact, the World cattle population is accounted for by only 20 countries.

Cattle population, however, appears to be increasing more rapidly in the tropics than elsewhere. The reasons for the tremendous population variation include:

1. Religious and other customary beliefs which prevent the eating of the flesh of cattle e.g. India produces 2 times as any other country. It is however, illegal to eat any of the cattle and the slaughter of buffalo is restricted. In most parts of Africa, cattle are slaughtered for ceremonial reasons
2. Some countries have a large geographical area with little ratio of number of population with number of cattle e.g. China. In this situation, the per capita beef consumption is low and limited;
3. Some countries have a small geographical area with a high ratio of number of people e.g. Finland. There they export some of the animal.
4. Some countries import considerable amount of beef they eat e.g. Switzerland.
5. Apart from geographical and religious factors, climate is an important factor in the distribution and production of cattle as it has direct and indirect effects on the animal. The direct effects are manifested on the animals themselves while the indirect effects are accounted for by climatic effects on their environment.
 - a. Super humid climatic areas are characterized by dense rain forest with tall trees with dense crowns and interlocking branches. Such areas have high humidity and excessive rainfall and climatic stress on livestock is considerable. Such areas are found in Indonesia, Philippines, Burma and S.E. Asia country, the West Coast India, part of West Africa, the East Coast of Central America, parts of South America. Forage is available all year round but it is usually low in protein, minerals and high in fibre content.
 - b. Humid areas are also forested but have moderately high temperature and lower humidity. Climatic stress is thus not as severe as in the super humid areas. Such areas have more potential for the development of animal husbandry.
 - c. Sub-humid areas are characterized by high grassland that may be interspersed with trees when it is known as Savanna. Rainfall is usually seasonal. Large areas of Savanna are found North and South of the Equator in Africa particularly in the East. Such areas also occur in India, S.E. Asia and North Australia, while smaller areas are found in Central and South America and in many of the Tropical highlands. Such areas are the most suitable for animal production and a large proportion of the tropical domesticated cattle are found there. In these areas the climatic stress on domestic livestock are more easily controlled. Even endemic diseases may be easier to control than in forest areas. In the absence of the major disease problems, nutrition, however, still constitutes a major problem of the animal industries since forage production is very seasonal.
 - d. The semi arid areas are characterized by short grasses, low humidity, high temperatures and low rainfall. In these areas nutritional stress and lack of water are greater limiting factors in animal husbandry than the climatic stress. It can however support livestock.
 - e. Disease also supports some livestock. Nomadic tribes follow the rains across deserts and feed flock on plants that spring up soon after rain. Irrigation helps to support high stocking rates or densities.

Direct Effects of Climate

- i. Effect of High Temperature- Exposure of beef cattle to temperature above 80°F (27°C) results in activation of the thermoregulatory mechanisms of the body, resulting in increased respiration and vaporization rates. At temperature above 95°F (35°C), there is failure of heat regulatory mechanism with consequent rise in rectal temperature, increase in water intake, reduced appetite, reduced growth and milk production and possible losses in body weight.
- ii. Effect of High Temperature on Grazing Habits: High temperature reduces the length of day time grazing of cattle.
- iii. Effect of High Temperature on Growth: This is due to effect on grazing time and feed intake
- iv. Effects of High Temperature on Milk Production. It depresses milk production and affects milk composition
- v. Effects of High Temperature on Reproduction: High testicular temperatures adversely affect spermatogenesis and hence, the fertility of the bull. There may be seminal degradation.
- vi. Effects of High Humidity. Humidity is the amount of vapour in the atmosphere:
 - a. High humidity add to the heat load of the animal by reducing evaporative heat loss
 - b. High humidity also depress the amount of daylight grazing
 - c. High humidity have some effect on feed intake (reduce it) and hence reduce productivity
 - d. High humidity lower the dry matter content of forages i.e., there would be high moisture content and low dry matter content

Indirect effects of climate

1. Effect on Feed supply: Climate affects the quantity and quality of feed available to the animal. This is because plant growth is dependent on temperature, precipitation and the length and intensity of day light while the quality of the feed is affected by precipitation and humidity.
2. Tropical forage matures quickly so that at the same age as the temperate type, it has higher crude fibre content and lower digestible nutrients but quicker maturity. Thus, tropical stocks have to digest more fibrous feed with resulting increase in heat load. In areas with high humidity, there is rapid deterioration in quality of mature forage. This is however less intense in drier area.
3. In humid and super-humid zones, forage contains such high water content and become bulky that the animal is unable to ingest a sufficient quantity containing enough dry matter to satisfy nutrient requirement.

Effects on parasites and diseases

High humidity and temperature zones favour the multiplication of endo- and ecto-parasites. This is because of the effect of vegetation on the incidence of insect vectors of disease. One of such dreaded vectors of disease is the tsetse fly which is a great threat to animal production. Various direct and indirect effects of climate on the animal have great significance in the determination of geographical distribution of world cattle population. The variations in climatic conditions also call for various physiological adaptations in the animal and the need to adjust to environmental pressure and behavioral patterns of the animal.