Rangelands of the State of Jalisco and its Livestock Industry

Sergio Soltero-Gardea and Luis Fernando Negrete-Ramos

The state of Jalisco is located at the central-western part of Mexico. It occupies an area of 8,013,700 hectares, about 4% of total area of Mexico and it is one of the most important states in the country in terms of its agricultural contribution to the national gross income.

Jalisco is a good example of Mexico's diversity. Because of its differences in topography, climate, and soils, the state shows a rich variety of ecosystems. There are arid and semi-arid rangelands, temperate forests, as well as tropical and subtropical brushlands. Only 2% of the area of Jalisco is considered to be irrigated farmland, whereas about 19% is described as rainfed farmland (SPP 1981). Accordingly, less than 80% of the area of Jalisco produces forage resources that potentially can be used by livestock.

The climate of Jalisco—

There are very contrasting climate characteristics in Jalisco; these differences are attributed to topography and the influence of bodies of water both from the Pacific Ocean and the inland water reservoirs, such as Chapala Lake, which is the biggest water body in Mexico. In Jalisco four climate types can be described namely, the semi dry climate (15%) in the north and northeast part of the state; temperate in the...
higher elevations (14%); semi tropical in the central part of Jalisco and around the Chapala Lake (45%); and tropical along the coastal region (25%). In terms of rainfall, there are regions in the state which receive about 16 inches of rain during the months of June through October, while the higher elevation areas receive about 40 inches of rain during the same period of time (Figure 1).

The soils of Jalisco.—

In Jalisco there are 18 soil classes which cover about 81% of the state, however 5 classes are the dominants. Their description is not included in this article because it is based on the FAO-UNESCO soil classification system, that is different than the U.S. system. However, soils are mostly acid with a pH that varies from 5.8 to 7.0; soil depth ranges from 10 cm to more than 1 m in depth, that is attributed to topography.

The ecosystems of Jalisco.—

Based on the studies conducted by COTECOCA (1979) to determine carrying capacity in rangelands of Jalisco, a total of 22 range types and about 70 range sites were identified. These range types can be grouped within four major ecosystems, such as the tropical mid-size brushland; tropical low-size deciduous brushland; Pine-Quercus–Juniperus forest and the open mid and bunchgrass rangelands (Table 1).

The tropical low-size deciduous brushland.—This vegetation type is widely distributed all over the state. It is located between 350 to 2,200 m above sea level (1,050 to 6,600 ft) and is dominated by low height trees, which seldom reach more than 10 m. The most common trees are: Lysiloma acaulescens, Lysiloma divaricata, Bursera excelsa, Bursera multifluga, Acacia pennatula, Acacia farnesiana, Ceiba aesculifolia, Eysenhardtia polystachya, Opuntia spp, Pithecellobium dulce, and Ipomoea intrapilosa. Most of these trees lose their leaves during a period of 5 to 7 months a year, therefore a changing phytosimony between the rainy and the dry season can be observed. The herbaceous vegetation is dominated by grass species like, Bouteloua curtipendula, Aristida adscensionis, Cathesicateum erectum, Sorghastrum incompeltem, Paspalum notatum, among many others. Grass production in this vegetation type can be as much as 1,000 kg/ha/year.

Tropical mid-size brushland.—

This vegetation type is located between 5 to 1,100 m above sea level (15 to 3,300 ft), and it is characterized by several tree species, reaching heights from 18 to 25 m. About 75% of these species lose their leaves in the dry season. The most important tree species are: Enterolobium cyclocarpum, Cedrela odorata, Ficus poldifolia, Tabebuia rosea, Ceiba pentandra, Brosimum alicastrum, and Swietenia humilis. Some of the grass species are: Bouteloua repens, B. radiosa, Cathespicum erectum, Hilaria ciliata, and Tripsacum sp.

Pinus-Oak-Juniperus forest.—This vegetation type is located in an elevation that goes from 1,200 to 2,900 m above sea level (3,600 to 8,700 ft). It is formed by trees that reach 6 to 25 m height; among the dominant tree species are: Pinus cembroides, P. michoacana, P. douglasiana, Quercus obtusata, Q. grisea, and Q. resinsosa. Brush species present in these areas are: Arbatus xalapensi, Arcto-staphylos pungens and Crataegus mexicana, and grass species like, Bouteloua hirsuta, B. repens, Paspalum sp., Setarea genticulata, Muhlenbergia macrorura, Panicum sp., and Muhlenbergia rigidia. Forage production in this range type is very low.

Open mid-grass and bunchgrass rangelands.—These rangelands are located between 1,600 to 2,300 m above sea level (4,800 to 6,900 ft), with slopes that varies from 1 to 10%. The mid-grass vegetation type is formed by perennial grasses like, Bouteloua gracilis, B. scorpioides, B. repens, B. hirsuta, B. curtipendula, Lycurus phleoides, Aristida divaricata and Heteropogon contortus. The bunchgrass range type, on the other hand, is formed by the same grass species mentioned previously, plus Bothriochloa barbinodis, Muhlenbergia rigidia, and Trachypogon secundus. Some of the brush species found in this area are: Prosopis laevigata, Acacia farnesiana, A. hartwegii, Opuntial sp., Mimosa biuncifera, and Celtis pallida among many others.

The Livestock Industry.—

Rangelands described previously are the home for more than 3.4 million heads of cattle (SAGAR 1995). Beef cattle numbers show an inventory of 2.6 million heads, whereas there is a dairy cattle inventory of 832,667 heads. During the last 7 years the statistics indicate a growing cattle population in Jalisco (Figure 2). There has been a 24% increase in cattle number in a 7-year period. In Jalisco beef cattle production and dairy production are the two most dominant activities.

Milk production is concentrated in the regions of Los Altos or Highlands and Chapala (Figure 3), through a system known as family dairy production. This system is made up of a combination of grazing stabling, consisting of small operations with an average herd of 20–25 lactating cows. Under this
system more than 3.2 million liters of milk is produced per day, which makes Jalisco the largest milk producing state in the country.

On the other hand, beef production in the other areas of Jalisco is done through cow-calf operations; in contrast to the northern states of Mexico that wean calves at 7–8 months for sale in the U.S. market, in the mountainous areas, the south, or the coast the animals are not sold until they reach sufficient weight to be sold to the feedlots located in the suburbs of Guadalajara. The only exception to this are the northern regions and the northern part of the Highlands or “Los Altos” where they use a similar system to the Mexican states that border the U.S. In the coastal regions and those bordering the central valleys, the cattle producers combine seasonal agriculture with cattle production. In other words, during the rainy season from June to October the animals are left to graze the higher mountain areas where the forage is better. Once the forage is used up, the animals are returned to the lower areas, especially the areas that have been cultivated, to then graze on the crop residues, particularly corn stover, and in some cases, introduced and improved pastures.

Cattle breeds vary depending upon the region, however, there is a high percentage dominated by the Zebu type and crossbreeds with some European sires. Because of climate and topography, it is thought that Zebu type and their crossbreeds have better performance due to their adaptability and disease resistance than pure European breeds. This is true in the tropical and semi-tropical areas. In spite of these constraints, during the last 5 to 10 years there has been an increasing interest in using European breed sires such as Charolais, Limousin, Simmental, Brown Swiss and others, to improve production and market conditions. There is a lot to do in this area, yet.

**Rangeland problems.**—

As is the case with many areas of the country, Jalisco has encountered a number of problems with the use of the ecosystems previously described. The most important is the overpopulation of cattle; for instance, the average stocking rate is 1.9 Ha/A.U. taking into account the area of the state and cattle population. This is considered to be extremely high, since there are areas in the state that have registered a carrying capacity of 25–30 Ha/A.U. One must also take into consideration that the majority of land in Jalisco is rocky and rough which is characterized by the low carrying capacity. Due to the high stocking rates, the cattle producers have to resort to a series of activities with the goal of finding enough food to sustain the animals during the dry season, such as improved pastures, corn silage, crop residues, etc. In addition, the producers located in the tropical and semi-tropical brushland and forests have tried to increase the carrying capacity of their lands by
clearing and planting grasses. Unfortunately, this has caused a significant deterioration of the ecosystems, which has resulted in a loss of productivity, soil loss, and generally a decline in range condition which could be considered from poor to fair. In the regions of “Los Altos” and the northern areas, the deterioration of the rangelands is manifested by the large population of undesirable brush species, which in some cases has reached densities of 3,500 to 4,000 plants per hectare.

In conclusion, the use of natural resources in Jalisco requires decision-making that will guarantee their careful usage. Of prime importance are the measures that need to be implemented concerning the use of water resources in Jalisco since water has always been and always will be the most valuable resource produced on the rangelands.

References

