

Youth Forum

Rangestasis

By Matthew Pfiefer

Editor's Note: This paper is the fifth-place winner of the High School Youth Forum contest at the Society for Range Management Annual Meeting, February 2007, Reno, Nevada.

As I sat in my sophomore biology class learning the process of homeostasis, I began to think about my family's rangeland management practices and the similarities between the two. For those of you needing a "refresher" in sophomore biology, homeostasis is defined as a process that occurs in a living organism that adjusts physiological processes to maintain internal equilibrium. Just as all living things must be able to adjust themselves to maintain an internal balance for life through homeostasis, we as range managers must also adjust our practices to ensure a healthy, productive rangeland. Thus, my theory of "rangestasis" was born.

The Theory of Rangestasis

- **Homeostasis:** a process that occurs in a living organism that adjusts physiological processes to maintain internal equilibrium
- **Rangestasis:** a process that occurs on a rangeland that adjusts management practices to maintain balanced rangeland

How is this balance of the rangelands met and maintained? How does one know when they have reached this balance? Well, I felt my family's cattle operation reached "rangestasis" when we were running approximately 1 cow to 6 acres and were being infiltrated with wildlife, which was unheard of before we reached a balanced rangeland. Our relatively high stocking rate is the result of several favorable factors, such as an average of 40 inches of rainfall per year, the ability to irrigate when needed, and the possession of established improved pastures. Although our focus was managing cattle, what we didn't realize at the time is that we had also created an ideal habitat and food source for wildlife. This unforeseen addition to the ecosystem could eventually create another source of income on our ranch through recreational hunting, which shows that a balanced rangeland is also a profitable one. And so, another component was added to my "rangestasis" theory in that living things receive life by maintaining homeostasis, and range managers receive profit if they maintain "rangestasis."

The story of how my family has strived to create a self-sustaining, profitable rangeland to ensure the property stays in the family and that conservation is practiced by future generations is not unlike what any other family property in the United States is currently

facing. However, I feel we must all see our private and public rangeland as one large living organism: we must work to maintain its health and adjust our practices when necessary to keep its homeostatic properties. The following is a brief summary of how I believe I was able to reach “rangestasis” through stewardship on my family’s property.

Sixty years ago rice farming in coastal Texas was very profitable and my great-grandfather, grandfather, and father were all successful rice farmers. But when my grandpa stopped farming rice 8 years ago, he converted his fields to rangelands by introducing both native as well as nonnative species of grasses that grow well in our subtropical environment. His new crop was grass, he would now use his cattle instead of combines to harvest it, and the profit would come from the calves he produced. He knew then that grass was necessary for his cattle, now his main source of income. But because his focus was on cattle production, not on the health and productivity of the range, there was an imbalance because the pasture was overgrazed and never reached its full potential.

A healthy herd and superior genetics was what my grandfather believed it took to make money in the cow business. Although these tools are important, they usually decrease profits through the purchase of registered bulls and expensive vaccines. So, after my grandpa left my Dad and me to manage the ranch we quickly developed and implemented a new management plan. Our goals were simple: to run as many cattle as possible, but also to reduce spending and improve the overall quality of the land. A rotational grazing system was the missing element to achieving rangestasis. This tool helped us reach our goals much faster than expected. Since cross-fencing left from the rice farming days were already in place and separated our property into 7 pastures, starting the system wasn’t difficult or expensive, it just had to be maintained.

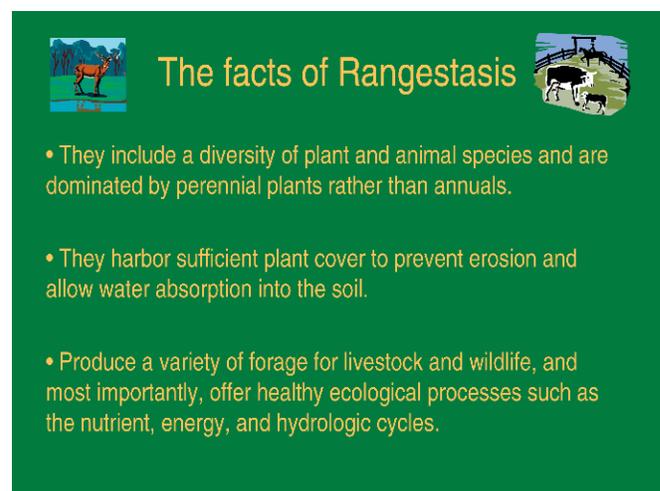
And this is where homeostatic features on the ranch such as carrying capacity are recognized and efforts are put in place so the stocking rates are not too high as to overgraze a pasture and not too low as to be undergrazed. The entire range must be at equilibrium so that the plant community is stable and not diminished. To fully understand this, let us look closer at homeostasis within living organisms.

Homeostasis is the maintenance of a stable internal environment. The term was first used in 1959 to describe how a multicellular organism must be maintained to allow functioning of tissues, organs, and cells. This internal environment must be maintained in a way that allows maximum efficiency controlled by the nervous system. The nervous system often utilizes loops connecting more than one system. Maintaining internal temperature is often done by the integration of more than one system, such as the use of the skin, muscular, and circulatory systems. When changes occur in the external environment they trigger a response in the internal environment.

Let us now explore the basic principles of healthy rangeland. Healthy rangelands include a diversity of plant and animal species and are dominated by perennial plants rather

than annuals. They harbor sufficient plant cover to prevent erosion and allow water absorption into the soil. Healthy rangelands also produce a variety of forage for livestock and wildlife and, most importantly, offer healthy ecological processes such as the nutrient, energy, and hydrologic cycles.

Range managers recognize healthy rangeland and use practices to enhance and maintain a healthy rangeland with programs like prescribed burning, brush control, and rotational grazing just as the nervous system recognizes a healthy body and uses control of one of the many body systems for it to remain that way. Just as with homeostatic features on the rangeland, the body has tolerable limits such as the concentration of oxygen and carbon dioxide. For instance, if a lung is damaged, then carbon dioxide levels in the blood get too high, thus endangering the whole body. The same basic principle can also be applied to rangeland in that if grasses are damaged by overgrazing, this diminishes habitat and food for all species and affects the entire rangeland.



The facts of Rangestasis

- They include a diversity of plant and animal species and are dominated by perennial plants rather than annuals.
- They harbor sufficient plant cover to prevent erosion and allow water absorption into the soil.
- Produce a variety of forage for livestock and wildlife, and most importantly, offer healthy ecological processes such as the nutrient, energy, and hydrologic cycles.

However, not all attempts to maintain homeostasis fail to accomplish the goal. When internal temperature gets too low the body’s response is for the muscles in the body to start shivering so that circulation of blood will raise the body temperature. This is similar to a range manager experiencing the introduction of a nonnative brush species and spot-spraying to rid it of his property. Spot-spraying and shivering are alike in that they are two solutions to short-term problems that require minimal effort, and are highly effective in producing the desired outcome.

By far, the use of multiple systems working together is the most common method used in homeostasis within the internal environment. After an organism gives birth it receives hormonal and nervous guidance on how to raise its offspring. The organism’s skeletal system might have expanded to allow an easier birth and the digestive system might allow for higher nutrition in the offspring’s diet. Positive feedback such as the nursing of a baby stimulates

Multiple Systems

- The use of multiple systems working together is the most common method used in homeostasis within the internal environment, success depends on feedback from the body.
- As with range management a manager may use more than one tool to produce the desired results, success depends on feedback from the range.

increased milk production. Multiple systems combined together allow the body to give birth and raise its young.

As with range management, a manager may use more than one tool to produce the desired results. If a rancher wanted a decrease in forb production he may use biological means to control them with the use of goats, and then follow this with a chemical solution. If the result of one of the control methods was successful in a certain part of the ranch he may not need the second method. The style and amount of application would all depend on feedback from the range.

There are many reasons to believe that a stable rangeland functions similarly to a living organism. In homeostasis, the removal of waste products such as excess salt and extracellular fluids is comparable to the removal of unwanted species of woody plants by a wildfire in rangeland. I believe homeostasis is naturally found in ecosystems around the world; however, those ecosystems touched by man such as rangelands must mimic natural processes as much as possible. There are many methods to control and maintain rangelands, and these processes are vital to sustaining the rangeland as a whole. But the most important component of any range management program is the recognition that one part of the rangeland affects the entire system. Maintaining the range will ensure that the entire system will flourish and continue the balance of “rangeland.”

It may be easier to find balanced rangelands, rather than trying to find the balance in which the rangelands belong. These delicate masses of land are part of an even larger picture, a picture that not only includes prairies, mountains, and deserts, but also towns, cities, and the people that live



in them. Stewardship of the rangelands is a small portion of the global conservation effort that is currently in place. If we as range managers do not take the appropriate steps to inform the public of the importance of creating and maintaining a healthy rangeland, we cannot expect to be considered as important as others involved in global conservation efforts. But the fact is that rangelands fit into an endless puzzle of landscapes and urban developments; they must be healthy so they can fit into their place properly and the entire system can reach a balance. Just as rangeland can be used to describe a balanced rangeland, the name can also represent how rangelands fit into the global balance of landscapes and ecosystems and the effect they have on each other.

Author is a student at Calhoun High School, Port Lavaca, TX. He is active in 4-H and involved in judging and raising livestock.