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1. Introduction:

In the cattle industry, it is important to understand that there is a myriad of different processes behind every cut of beef. In order for these quality cuts to be so readily available at restaurants and supermarkets across the world, research must be conducted in order to keep the industry running smoothly; after all, beef consumption has been growing at a consistent rate as the world population continues to increase. As a result, each calf needs to perform and produce well, but there are many stressors that can negatively affect its overall performance. As an intern at Eastern Oregon Agricultural Research Center (EOARC) in Burns, Oregon, I worked with Dr. Juliana Ranches and assisted in two separate studies which focused on trace mineral injections in heifers and their calves along with mineral supplementation in pre-weaned calves; after working closely with calves and gaining a lot of hands-on experience, I learned that cattle-based research can be a challenging yet vital way to increase beef production.

2. Internship Location:

At EOARC in Burns, OR, I was able to work closely with cattle in both outdoor and lab settings, where I was able to learn more about the research involved in the beef industry by contributing to the studies led by Dr. Ranches. At EOARC, the sponsoring organization, is composed of both state and federal lands. Main offices and laboratory facilities are located on 640 acres of state land south of Burns. The state land is referred to as Section Five. In this location most of the meadowland ecology and management research takes place. All the hay needed to support the cattle during winter is produced at Section five.

The Northern Great Basin Experimental Range (NGBER) is the rangeland property. It is federally administered and encompasses over 16,000 acres. It is located about 35 miles west of Burns. The rangeland at NGBER supports a variety of plant communities dominated by western juniper, three subspecies of big sagebrush, two species of low sagebrush, and many of the grasses and forbs common to Intermountain and northern Great Basin rangelands. Improved pastures of crested wheatgrass are also present. Both locations are equipped with fully functional cattle working facilities with a silencer squeeze chute, allowing for easy cattle handling. Additionally, both cattle working facilities have several holding pens, allowing for a large number of animals to be worked at the same time. The current EOARC herd has approximately 300 cow-calf pairs.

Offices, conference rooms, laboratories, barns, and shops are located on the state property, at the Section 5 headquarters. The three main laboratories at the EOARC are the Animal Physiology, PCR Lab (both responsibility of Dr. Ranches), and the Wet Lab (responsibility of Dr. Bohnert).

The EOARC, the mission is stated as follows:

The mission of the Oregon State University Agricultural Experiment Station is to conduct research and provide demonstrations in agriculture, biological, social, and environmental sciences that contribute to the economic, environmental, and social health of Oregon.

Works with Oregonians to protect crops and domestic animals from insects, diseases, and other hazards, and ensure stable, productive agriculture through wise use of natural resources.

3. Internship Activities and Objectives

As a prospective fish and wildlife student, I selected this particular internship in order to gain some hands-on experience working with livestock, and I also wanted to learn more about research specifically related to the cattle industry. As an undergraduate student, I believe that opportunities such as this can be limited to graduate students and upperclassmen; after being made aware that Branch Experiment Station internships were open to undergraduates as well, I figured that this would be an amazing opportunity to gain experience working closely with cattle and make some connections in the industry early on in my academic career. I also wanted to get comfortable working closely with cattle along with learning the specific processes and tasks that directly contribute to cattle research. The purpose of my position was to assist Dr. Ranches in the following projects:

- (1) -Effects of mineral supplementation of pre-weaned calves: What is the current recommendation?***
- (2) -Effects of trace mineral injections on measures of performance and trace mineral status of heifers and their calves.***

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As explained in the research proposal, the purpose of this study (1) is to assist calves that are in the process of being weaned in order to enhance their performance through mineral supplementation. Calves often go through a great amount of stress during the weaning process which can result in varying endocrine and neuroendocrine levels, and this study aims to determine the optimal level of mineral supplementation that would result in better animal performance and health. In order to contribute to these studies, skills I practiced included feeding and gathering calves, assisting in taking blood samples and liver biopsies (*Figure 1*), and making the supplements relevant to the study.



Figure 1: Collection of samples (blood and liver) that will be used for evaluation of cattle mineral status.

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Typically, we would gather up the calves, separate each calf into its own pen, measure out one pound of feed and mix in the supplement. This would be done three times per week, and the supplements were composed of selenium, copper, and zinc.

The later study (2) aims to evaluate the use of injectable trace minerals provided early in cattle life (at birth) and how that would affect animal performance and health later in life.

At the beginning of my internship, I established three learning objectives with Dr. Ranches which I would follow and focus on throughout the internship, and after learning more about the study and its objectives along with working closely with cattle throughout the past two months, I believe that I have successfully met my learning objectives. My first learning objective was to gain knowledge and experience about beef cattle care. I would say that I have successfully met this learning objective because I did not know much about the cattle industry and the research that contributes to it other than general ranch hand duties whenever I first started, and throughout this internship I have learned how to accurately work with and handle cattle in a professional and humane manner. This is important for students entering the cattle industry because working with cattle requires both patience and caution. My second learning objective was to gain knowledge about beef cattle behavior, health, and nutrition. I have successfully met this learning objective as a result of working closely with cattle throughout my time at EOARC, and I have become well acquainted with the contributing factors to their behavior, including the do's and don'ts of working in close quarters with cattle. In regards to their health and nutrition, I have learned about the diet of the cattle along with the supplements which are mixed in with their feed. These supplements could prove to be beneficial to their health and performance as it has the potential to aid calves in the weaning process. My third learning objective was to gain knowledge about mineral nutrition and supplementation, mineral

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supplementation strategies, and the impact on cattle health and performance, all specific to beef cattle. I have met this learning objective by learning how to make mineral-based supplements, and I am currently still in the process of learning the effects that the supplements have on cattle health and performance. I believe that I still have more to learn for this objective as the study continues, and the specific effects on the calves is still undetermined.

In regards to conservation and management, I believe that these particular studies contribute to the preservation and protection of beef cattle as a natural, renewable resource. As a result, proper management techniques on all levels of this vast industry are required in order for it to prosper for decades to come. As explained in the project proposal, calves often go through a great amount of stress when being weaned, which can negatively affect their performance post-weaning. The use of mineral supplementation can potentially account for the negative effects that pre-weaned calves endure throughout the process, which would result in a better overall performance. Studies on mineral supplementation in mature cattle have been covered to a much larger degree, while studies on mineral supplementation in pre-weaned calves is limited. With these aspects taken into consideration, mineral supplementation can contribute to better management of cattle, a natural resource, as it can account for the negative effects of stressors that calves experience while weaning. Prior to beginning this internship, I was unaware of the negative effects that come as a result of the weaning process. I have learned quite a bit about the scientific techniques behind mineral supplementation, and this study aims to contribute to effective management and growth of calves through this process.

4. Professional Development and Interactions

During my internship, I had the opportunity to visit with Vanessa Schroeder (Faculty Research Assistant, RFA) about her position at EOARC and her research that contributes to the wildlife field. Vanessa is the senior faculty research assistant at EOARC, and works through OSU's extension service to provide information from research projects to stakeholders, including the Bureau of Land Management (BLM), the Fish and Wildlife Service, along with local ranchers leasing land from the BLM. Although the specific work and research that is conducted through government agencies and universities can seem extensive and confusing, OSU's extension service aims to provide expertise and information to local communities across Oregon, which can make many of the issues that threaten wildlife habitats and ecosystems become more prominent.

Much of the eastern portion of Oregon is composed of dry, predominantly sagebrush and juniper habitat, and after speaking with Vanessa, she explained the importance of preserving this type of environment, which is what both OSU and the stakeholders aim to do through effective grazing techniques, managing invasive species, and managing wildfires. Specific to the northern great basin, one of the biggest threats to sagebrush ecosystems is invasive annual grasses and conifers. As explained by Vanessa, after a wildfire burns a plot of land, invasive annual grasses can easily take over the ecosystem. Resources are limited to treat this threat to the ecosystem, which is why research is vital in order to preserve the greater sagebrush ecosystem. She also works with the Fish and Wildlife Service on both sage grouse and mule deer research in areas around Harney County and the northern great basin area, including the Steens Mountain range and various plots of BLM land. After speaking with Vanessa, I learned that being successful in the wildlife industry involves quite a bit of extensive research, which often is a long and

sometimes difficult process depending on the location, funding, and profoundness of the study. After learning more about the specific goals of wildlife research along with the tasks that contribute to it, it is easy to see how my courses and classwork, even as an undergraduate, are vital to being successful in this line of work.

5. Conclusions

This internship has impacted my academic development in many ways; I have learned a lot more about the specific research that contributes to the cattle industry and how it can affect heifers and calves, and I have learned how the research for this industry is conducted both in a rangeland and lab setting. Even after having worked with cattle many times in the past, I was unaware of how something such as mineral supplementation can positively contribute to the overall performance of calves, and I was also unaware of the negative effects that stressors can have on calves, especially during their weaning period. Overall, I believe that this experience has positively impacted my academic career, and it is really the first professional position I have held that directly contributes to my career interests. This internship was my first government position, and I also learned about the overall work environment for both federal and state employees along with the qualifications that are required in order to move up the career ladder in this industry. This knowledge is not something I ever could have learned in a classroom setting, and I was able to work closely with Dr. Ranches to learn more about beef cattle research.

After spending the summer at EOARC-Burns and having the opportunity to get involved in beef cattle research at such an early stage in my career, I feel confident in continuing my education in the wildlife industry through OSU. I hope to gain more experience during the next couple of years as I have learned that opportunities such as this, which provide large amounts of

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field work and hands-on experience, are very important when it comes to finding a job in this industry.

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