Cattle Monitoring In a Feedlot

New Mexico

Supercomputing Challenge

Final Report

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Team Number: 85

Melrose High School

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Executive Summary:

Record keeping is a vital part of running any business, from Wall Street businesses to even ranchers in the country. Keeping records helps to sustain a functioning and prominent business by being able to identify and track items and processes that create expenditures or that bring in profit and prosperity. Agricultural producers use records like any other business, perhaps even more. A rancher will use record keeping to know exactly what feeds work the best, what sicknesses are common to them (so that they may plan accordingly), and to make financial plans in accordance with the results of previous years to try and recreate their successes while minimizing the expenditures they may have faced.

The problem we are trying to diminish is that looking through these records can be relatively time consuming as well as having large amounts of data that can be difficult to be able to take it in all at once. This gave our team the idea to simply this process by being able to visualize and analyze that the data that is being represented in the program.

We used the modeling program NetLogo to create a method for ranchers to plan out their year and to keep a digital track of their financing, as well as using the modeling to create a prediction for expenditures and health. The program will run many different variables to try and get the most realistic set of events. It will run feed consumption, treatment costs, spread of disease, and the best methods for quarantining sick stock.

Knowing approximately how much the rancher will spend on feed is a large part of any ranching operation and is central to the core of the business. To try to model this as best we could, we researched prices of different grades of feed to incorporate them into the model. Each of the animals eats a certain amount per day based off of how healthy the stock is. These results can be utilized by a producer to make production decisions.

Problem Statement:

Our team will be facing the issue of simplifying data involved with the record keeping in a ranching establishment. We will be transferring the data into a more simplicity and visual way. The program we are using will work with NetLogo in order to create an interface between the Excel spreadsheets, the program most ranchers use to keep a keep track of their records that will pull data from the Excel program into the modeling program. We will use such variables as the pricings of feeds for sick and healthy stock, the number of sick in comparison to healthy, and the program will keep a track on the number of animals in the different types of pens.

Programming:

Our programming is designed to give the data, which the rancher is observing, a more visual representation to the numerical values that would be easier to use to plan out the financial processes that they would need to give their business the best chance at prosperity. To do this the program is made to specifically pull data from an Excel spreadsheet to incorporate the information that they have collected before into a working physical/numerical model.

The program is set around individual pens, it does so by setting up areas for the healthy stock (or the healthy pens) and designating areas for the stock that are showing signs of sickness (or sick pens). Each of the different types of pens are set to where the data for feed costs is inserted into the program where it will map out the cost to feed sick stock compared to the healthy stock. Also, each pen is only capable of handling so many animals efficiently and we will try to incorporate a way to link the number of animals from the spreadsheet into the size and number of pens that would work best for the rancher's specific needs.

Results and Conclusions:

With the current working model we are having some small issues with coming out with realistic data in the model comparison to the reality of the feedlot we are observing. We are working to fix some of the outcome data problems, but for the most part the project is beginning to work much more smoothly and could be a valuable tool when we have worked out all the small bugs.

Currently the model shows the numbers of stock in each of the pen. We have the model setup to run the numbers of each of the stock in a given pen, the type of pen it is in, and the number will be displayed in its relevant pen. It also will use this information to calculate percentages and give the operations an overall efficiency rating.

Validation:

Fortunately our validations are quite simple. The data we are using has already been generated and there is not exactly a true experiment being run, this allows us to be able to correct our processes to be more accurate and precise. This is true because we are merely taking results from an actual ranch and are able to check ourselves and our program and make sure that it generates the data correctly and it gives us the opportunity to validate the calculations we use to process the data.

Acknowledgements:

A local rancher, Danny Fish, has provided us with the most assistance, giving us the means to study the program he uses for record keeping and being able to incorporate it into our model, as well as the methods he uses in managing his feedlot. He also served as the original

inspiration of this project when he asked for some small assistance in completing the Excel program he had been working on. Our high school science teacher and sponsor, Alan Daugherty, has also provided us with a great deal of assistance in the programming area of my project.

Citations:

Feed and feeding – Frank Morrison, 1949; 8th edition.

Modern Livestock & Poultry Production – James R. Gillespie, 2002

Danny Fish, a local rancher, has provided a large amount of information in modern feeds and feeding processes.