

THE RANGE BEEF CATTLE PRODUCTION SYSTEM

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The production of red meat from range forage can be as simple as turning the breeding herd on range and gathering the offspring and survivors, selling the steers and culls and hoping you get another crop of calves next year. This probably occurred 100 or more years ago and in some cases 50 years ago or less. However, those days are gone. No longer can we take what we get and survive with it. Each year the raising of beef becomes more complicated.

We continually ask, "What can we do to become more efficient in production?" Experimentation by research scientists, and by ranchers themselves, has resulted in new products, improved management, better breeding, changes in forage and other agronomic management, hybrids and crossbreds and a host of items that have led to increased production and efficiency. Some of this is the result of very basic science and some of it trial and error but there have been great increases in total production and efficiency of production. Have we gone as far as we can? Have we reached the pinnacle of production? No. We have only scratched the surface, and we had better continue searching because we have to produce more food more efficiently to meet the needs of a hungry world. We also have to keep the rancher or farmer solvent and make agriculture profitable if this nation's production is to continue.

It seems that new products, new breeds, new forages, new management techniques and a host of alternatives are available to the producer. But, which one or which combination should be used? The producer has a choice between a variety of options in management, in his range or forage management, harvesting methods, feed additives and adjuvants, breeds and sizes. Neither the rancher nor the researcher can test them all singly, let alone in combination. It appears the computer age is here for the range livestock operator and for all segments of agriculture. Automobiles are now computerized so the computer selects the fuel mixture, engine temperature, and gear ratios for optimum efficiency. So be it for the cow and the rancher.

We have for years been conducting research at the Squaw Butte and Union Stations of the Eastern Oregon Agricultural Research Center on forage production and management with native and seeded forages, and have gathered beef production data for various classes and management schemes. We can relate beef production to forage quality and forage quality and yield to precipitation patterns and various cultural practices. We have experimented with fall and spring calving, artificial insemination and estrus synchronization and various products that increase production efficiency.

Systems Science. System and modeling research is becoming common in today's world. It employs various techniques to study the operation and management of complex systems.

This research station is attempting to develop a computer model to optimize the use of range, complementary forages and supplements, or available byproducts, for red meat production. The data base will be the Squaw Butte Station. Data from other research stations in the western United States will be used, when required, to complement the data that we have. The model under development includes four major aspects as presented in Table 1.

Table 1. Major components of the model

Major factors	Components										
ENVIRONMENTAL	<table border="0"> <tr> <td>Climatic</td> <td>Non-climatic</td> </tr> <tr> <td>1. rainfall</td> <td>1. forage available</td> </tr> <tr> <td>2. humidity</td> <td>2. forage quality</td> </tr> <tr> <td>3. temperature</td> <td></td> </tr> <tr> <td>4. radiation</td> <td></td> </tr> </table>	Climatic	Non-climatic	1. rainfall	1. forage available	2. humidity	2. forage quality	3. temperature		4. radiation	
Climatic	Non-climatic										
1. rainfall	1. forage available										
2. humidity	2. forage quality										
3. temperature											
4. radiation											
ANIMAL	Physiological status Physical activity Forage intake										
ECONOMIC	Land use alternatives Red meat demand Red meat available Residue feed availability										
MANAGEMENT	Supplementation Range improvement - seeding - spraying, etc. Water development Time of calving and weaning Method of forage utilization Age of marketing										

Information in the table is an oversimplification. Submodels will be developed to permit exploration and testing of various components. For example, under "management factors" a submodel will permit evaluation of supplementation under various types of ranges with fall or spring calving, or yearlings versus weaner calf production, etc. Also, the use of various additives or implants can be simulated here. Economics or environmental parameters can be placed at nearly any point in the model or submodel.

SUMMARY

Agriculture is becoming too complex to solve or evaluate alternatives with a pencil. The computer model should make it possible to answer such a question as, "Will I get the greatest economic return from fertilizing my meadows, my range or from some management change in my livestock program? I only have so much money to spend."

The computer can give the answer and set priorities for the next increment. It is our intent to use and test the model on the static operation. Not only should it tell us where we can get the greatest return from inputs, but tell us which research areas need emphasis.