Cattle Business in Mississippi – January 2014
"Beef Production Strategies" article

Precision Production on Cattle Operations

Jane Parish – Extension Beef Cattle Specialist, Mississippi State University

Precision Agriculture

Precision agriculture is not a new concept. Row crop farms commonly use precision agriculture technologies to selectively apply inputs to areas of fields according to relevant measured variables. Precision agriculture is sometimes called site-specific crop management or satellite farming because it relies on computerized mapping systems and global positioning system satellites that measure and respond to variations among and within fields at specific sites. Farmers incorporate global positioning systems and various sensors in farming practices to do things like vary by location the amount of fertilizer spread based on factors such as soil fertility levels. The usefulness of precision agriculture systems is that they put resources where they are most needed. They also cumulate vast amounts of information about a farm that can be used for both documentation and planning purposes.

So how can cattle operations adopt precision agriculture concepts to improve production practices? In a nutshell, precision production involves putting the right amounts and types of inputs in the right places at the right times. It is easy to argue that doing this on a cattle operation would be beneficial, and here is the catch, so long as the costs are not overwhelming. Face it --- a fully equipped cab tractor ready for variable-rate action is not cheap. Although it may not be cost effective for a typical small cattle operation to make the often sizeable capital investments in high-end farming equipment with variable rate capabilities as readily found in row crop operations, precision agriculture practices can still be adapted to ranch settings.

Application #1: Soil fertility

Soil fertility management is a major emphasis in row crop precision agriculture applications, and forage-based cattle production can take a page from that playbook. Wouldn't it be nice to cut the fertilizer bill and yet still get great forage yield and quality results to fertilizer applications? To justify large capital investments in variable-rate capable equipment, the production operation must be of sufficient size and the savings in input costs and improved production over time significant enough to pay back the equipment and technology bills and then some. For the many small cattle herds in production, this is probably not realistic. But for the large acreage operations that do not skimp on fertilizer applications and general forage management, it is worth penciling expense and income projections out on paper to see if it is worth pursuing.

The small operations are not left completely out of using precision practices in managing soil fertility though. The scale and degree of precision does not have to

approach that of the row crop precision agriculture systems to still hold economic and environmental value for cattle operations. Lesser improvements are worthwhile as well. Manual soil testing and identification of nutrient management zones within these operations is doable and advisable before applying fertilizer. In a sense, the long-standing extension recommendation of soil testing to determine fertilizer application needs is a rough version of precision agriculture. Inputs (various types of fertilizers) are applied when needed to specific locations (land areas represented by soil samples) based on data collected and analyzed (soil testing results).

Application #2: Matching sires to breeding females

How can animal breeding practices be considered precision production management? The key here is matching. If sires are appropriately matched to subsets of females within herds, then the right amounts of inputs (his heritable traits) are applied to specific production assets (selected herd females as opposed to field in the previous example) at the right time based on data collected and analyzed (up-to-date herd performance information and genetic merit predictions or EPDs). To put it simply, sires are selected to match the genetic improvement needs of the breeding groups on which they are used.

The greater the in-herd variation, the more likely that using multiple sires specifically matched to breeding management groups (groups of cows or heifers within the breeding herds that are somewhat similar in performance levels of economically relevant traits) will be beneficial. Herds that are fairly consistent in their genetic makeup might be effectively mated in fewer breeding groups than a less consistent herd. If one group of cows needs a terminal sire to improve growth traits, while another group of cows in the same herd already performs very well for growth but lags expectations for carcass merit, then it makes good sense to separate out these breeding groups based on their genetic improvement needs and mate them accordingly.

A word of caution needs to be added here. If precision mating is taken too far, i.e., every female in the herd is bred to a different sire, then the value of this practice is tempered with some drawbacks. It is difficult to determine how well a sire worked in a herd if he was only mated to one or a few cows. Think meaningful contemporary groups here. Logistically speaking, a 40-cow herd cannot afford to use a multitude of natural-service sires because the cost of each bull is not spread out over enough females (although artificial insemination makes using many different sires more feasible). In addition, likely there are not enough separate pastures on that size of operation to accommodate excessive breeding management groups either.

Application #3: Labor scheduling and management

Ever notice that retail stores tend to have more employees working during peak business days and times than during less busy periods? This is not by accident. These stores know that they need enough workers on hand at any given time to effectively operate, but they do not want to overstaff and get stuck paying for more worker hours

than they really need. Again, the right amounts (worker numbers) and types (managers, clerks, etc.) of inputs are applied (scheduled to work) at the right times based on information collected and analyzed (past customer load history and projections of future customer loads). Cattle operations can do the same thing, regardless of size.

Cattle production is seasonal by nature. For cow-calf operations, there is breeding season, calving season, weaning time, etc. For stocker operations, there are receiving, warm-up, stockering, and shipping periods. There are times of year that hay and grain-based supplement are constantly put out for herds and other times during which cattle rely on pasture and mineral and vitamin supplement alone. Given this, it is reasonable to staff cattle operations based on the anticipated work load. Even operations that only hire temporary help should take advantage of precision scheduling of these workers based upon operational labor requirements. One caveat to this it that a high-value worker may not be willing to do just seasonal or part-time work and will only come on board if full-time employment is promised.

Besides scheduling workers based on operational labor needs, these workers must be properly managed to ensure that they accomplish desired tasks within specified time frames. Keep workers busy with preplanned and meaningful tasks. That way paid labor hours are not wasted.

Adoption of Precision Practices

So although precision agriculture is for now generally associated with row crop operations, it is relevant and useful to cattle operations today. Many other beef cattle production examples besides the ones presented here can make good use of the concept of precision application of inputs. An underlying theme in all of these applications is to base input use decisions on good information. Taking it a step further, monitoring and evaluation of precision practices over time should be done to refine management decisions. With further advancements in technology and affordable access to these technologies, the high-tech, row crop only practices of today may become commonplace on the cattle operations of the future. In the meantime, look for opportunities to put present technologies and their underlying concepts to work on the cattle operations of today.

For more information about beef cattle production, contact an office of the Mississippi State University Extension Service or visit *msucares.com/livestock/beef*.