Arkansas Beef Improvement Program: Whole-farm program[1]

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Story in Brief

The Arkansas Beef Improvement Program (ABIP) uses an integrated resource management approach to balance ranch resources and to enhance efficiency and profitability of cattle producers. Production and financial parameters were measured over a 5-year period to evaluate progress with whole farms. Since 1992, 15 cooperators completed the ABIP whole-farm program. Analysis across all completed whole ABIP farms revealed that herd break-even decreased 28.2% ($0.52 ± 0.12 to $0.37 ± 0.14. lb; $P < 0.03$), average specified cost/animal unit (AU) tended to decrease ($226.35 ± 108.05 to $174.42 ± 79.16; $P = 0.19$), mature cow calf crop percent tended to increase (84.6 ± 11.15% to 93.3 ± 5.24%; $P = 0.14$), and return over specified cost/AU increased 121.7% ($98.50 ± 62.43 to $218.35 ± 92.31; $P < 0.05$) from year 1 to year 5. The ABIP accomplished its educational objectives and made an impact on the Arkansas cattle industry.

Introduction

Technology transfer from land grant institutions to agricultural producers may create awareness, but seldom leads to adoption (Beverly, 1988). This is evident because 53.6% of operations have no set calving season, 51.9% do not use individual calf identification, 91% do not laboratory test feedstuffs (hay), and only 22% reported they calculated a balanced diet (NAHMS, 1997). It is not the discovery of new technology but rather the adoption of proven technology that can greatly influence the profitability of a cow-calf operation. Economical cow-calf management is an impossible task if a logical and practical approach has not been developed for collecting and analyzing information, evaluating plans, and directing daily operations. Management practices change over time and from farm to farm, region to region and state to state. The decision-making process to select the appropriate management practice, however, does not change. Therefore, the Arkansas Beef Improvement Program (ABIP) was designed to use multiple educational methods to teach decision-making skills and beef cattle and forage management practices. The objective of this paper is to document progress in the ABIP whole-farm program.

Experimental Procedures

The goal of the ABIP program was to balance ranch resources to enhance the efficiency and profitability of Arkansas cattle production. The ABIP decision-making process involves setting goals, evaluating resources, and selecting the management practices to achieve those goals. An ABIP team was established for each farm and consisted of specialists, the local Extension agent and cooperator. This team worked together to identify the cooperator's goals, recognize resource limitations and establish a plan of work to achieve those goals. The Extension agent was a critical member of the team. He/She worked directly with the cooperator, monitored changing conditions, scheduled activities with specialists and assisted with data collection.

The ABIP whole-farm program required a 5-year commitment. Seven management practices were implemented on the whole-farm demonstrations. They included completing a cow-calf budget, forage testing, soil testing, cow herd performance, enrolling steers in the Arkansas Steer Feedout Program, pasture inventories and completing production calendars. Benchmark data were collected during year 1. Beginning year 2, a plan of work was established to reach the cooperator's goals. Information was collected annually to document change due to management.

During March and April, the ABIP team visited with each cooperator to evaluate the accomplishments of the past year, discuss new data, review the plan of work and cooperator's goals, and establish management plans for the coming year. Additional farm visits were made by the ABIP team members (either together or individually) throughout the year. Since 1992, 15 cooperators completed the ABIP whole-farm program. In any given year, three to four farms were active in the whole-farm program.

Cow-Calf Budget Description. The budget included herd inventory, number of animal units (AU), production information, income and expenses. The herd inventory reflected the number of animals as of January 1 of the budget year. It included mature cows (a female pregnant with at least her second calf), growing heifers (weaned heifers that had not conceived), first-calf heifers (heifers that were pregnant or nursing their first calf but were not pregnant with their second calf), bulls for breeding the mature cow herd and heifers, and growing bulls (6 to 16 mo of age). Total number of AU in the cow herd was calculated based on metabolizable energy requirements as described by Gadberry and Troxel (1999).

Production information was separated into four groups – mature cows, growing heifers, pregnant heifers and bulls. The production information was a summary of calf crop percentage, pregnancy rate, culling percentage, replacement rate, death loss, number of females exposed to the bull and useful life of a bull. All calf crop percentages were determined by dividing the number of calves weaned by the number of females exposed to the bull. Death loss was determined by dividing the number of dead animals (cows, heifers, etc.) by the total number of animals.

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Income summary included the number of head sold, average BW/head and average price/cwt. Included in the income section were calculated values for total pounds sold, total gross income, average selling price for the entire herd, total pounds sold/AU and gross income/AU. Budgets were completed each year. Year 1 budgets served as the baseline, and for comparisons of budget in subsequent years, the selling price established in the baseline year was used to determine income in subsequent years to prevent market price changes from confounding the results.

The specified expenses included salt and mineral, supplemental feed, veterinarian costs, growth implants, fly control, sales commission, hauling, day labor, pregnancy testing, bull cost or AI, breeding soundness examinations, replacement heifer or cow purchase, grazing lease, fertilizer, lime, purchased hay, herbicide and miscellaneous. No overhead items such as family expenses, machinery, depreciation, etc., were included in the budget. Summarized values included total specified cost, total specified cost/AU, herd break-even/pound (specified cost divided by pounds of beef sold), return over specified cost, and return over specified cost/AU. Comparisons were also made across farms on an AU basis.

Analysis. Where statistical analysis was not appropriate, means ± SD were used to describe the data. The t-test as described by Freund and Wilson (1993) was used to determine if the percent change in production items was different from a zero percent change within the whole-farm program. An analysis of variance was performed with the GLM procedure of SAS (SAS Inst., Inc., Cary, N.C.) to analyze production-level differences in the whole-farm programs.

Results and Discussion

The most common goal expressed by the cooperator was to improve beef cattle production efficiency. Although the whole farm was managed with an integrated resource philosophy, improving beef cattle production efficiency meant concentrating on specific limited resources for each farm. For example, some ABIP teams identified beef cattle genetics or pasture conditions as limiting, and those received concentrated management efforts. As time progressed, the ABIP team (including the cooperator) identified additional limiting resources, and management efforts shifted.

The average number of mature cows during the first year of the whole-farm program was 68 ± 46.7 head. Of the 15 whole-farm cooperators, four had a herd size of 30 head or less. The number of mature cows increased by an average of 34.1% ($P < 0.06$) from year 1 to 5 (91 ± 81.6 head). Increasing the number of mature cows was a goal for eight cooperators. Additional land was not obtained, but pasture and soil fertility management was implemented to improve forage resources.

Herd break-even/pound of beef sold was used to measure beef production efficiency. The average herd break-even decreased ($P < 0.01$) from year 1 ($0.52 ± 0.12/lb) to 5 ($0.37 ± 0.14/lb). The decrease in herd break-even was 28.2% ($P < 0.03$). Major factors that influenced herd break-evens were increased beef production, reduced specific production cost, or both.

Beef sold/AU (lb/AU) during year 1 averaged 436 ± 159.8 lb. Beef cattle sold included steers, heifers not kept for replacements, and market bulls and cows. Beef sold increased by 23.6% to 539 ± 345.7 lb by year 5. Since the goal for a number of cooperators was to increase the number of mature cows, it was common for beef sold/AU to decrease in year 2 and 3. Working with a cow herd for 5 years was not enough to document completely the financial impact of this major management change.

Specified cost/AU tended to decrease 22.9% ($P = 0.19$) from year 1 to 5. The average specified cost/AU tended to decrease ($P = 0.14$) from year 1 ($226.35 ± 108.05) to year 5 ($174.42 ± 79.16). Along with a tendency to decrease specified costs/AU, variability in costs decreased 27%. When evaluating specified cost/AU, three general circumstances existed. The first was excessively high specified cost/AU; therefore, cost-reducing measures were taken without reducing cattle performance. The second was that specified cost/AU actually increased but resulted in cost-effective improvements in beef production. The third circumstance was the specified cost/AU was not changed, but funds were reallocated to more cost-effective expenses.

The average mature cow calf crop percentage in year 1 was 84.6 ± 11.15% and tended to increase ($P = 0.14$) to 93.3 ± 5.24% by year 5. This tendency may not be expected to be highly significant because calf crop percentages above 93% may be close to the biological maximum (e.g., 100% is not a realistic maximum). The percentage change in calf crop was significant ($P < 0.01$). Improving mature cow reproductive rates was an accumulation of a number of management practices such as culling non-productive cows, improving nutrition and mineral supplementation, etc. Improving mature cow reproduction rates from 84.6 to 93.3% while reducing specified cost/AU by 22.9% was important to improving beef production efficiency.

Overall, economic return over specified cost/AU increased 121.7% ($P < 0.05$). Return over specified cost/AU in year 1 averaged $98.50 ± 62.43 and increased ($P < 0.04$) to $218.35 ± 92.31 by year 5. In year 5, each AU contributed an average of $218.35 to pay overhead and family expenses. This documents that ABIP improved efficiency, improved return above specified cost and achieved the cooperators' goals. Record keeping was critical to document changes due to management. Many cooperators stated that the budget was the most challenging item to complete, but it was the item from which they learned the most.

Harvested forages (hay) were analyzed for nutritional value from all cuttings from all hay meadows each year. During year 1, hays were analyzed, and cooperators fed their normal supplement during the winter period. This was done to document the baseline forage quality and supplemental feeding cost. Beginning in year 2, management practices to improve hay quality and enhance supplemental feeding were implemented. Supplemental feed was defined as purchased feed (corn, cottonseed meal, protein supplements, etc.) and did not include hay cost. The average supplemental feed cost/AU during year 1 was $48 ± 52.51. Supplemental feed cost was reduced to $24 ± 13.88/AU by year 5. Analyzing the forage for nutritional value demonstrated the importance of harvesting hay that meets the nutritional requirement of the herd. Cooperators realized that the greater the hay quality, the fewer supplements were required. Cutting interval, weather, soil fertility, forage variety, etc., can affect hay quality. Managing the small details apparently resulted in improved hay quality and reduced supplemental feeding cost.

Soil samples were analyzed for all hay meadows and pastures. On some farms, the soil nutrient profile (pH, phosphorus (P), and potassium (K)) was acceptable, and a maintenance fertilizer program was recommended. Historically, use of chicken and/or turkey litter for fertilizer resulted in some farms having fields with greater P levels. For those situations, commercial fertilizer blends providing N and K were recommended. For example, the soil P level for a whole-farm pasture in year 1 was 537 lb/acre and 427 lb/acre by year 5. Another example demonstrated how soil fertility was used to address a thinning stand of Tifton 44 bermudagrass. It was determined that K levels were too low (60 lb/acre). It was recommended that soil K should be above 200 lb/acre. A fertilization program was implement-

ed to increase soil K. By year 5, soil K improved to 278 lb/acre, and the percentage of Tifton 44 bermudagrass improved from 83 to 93%. Open ground decreased from 10 to 0%.

Calves were weighed to determine 205-d adjusted BW and ratios according to Beef Improvement Guidelines (BIF, 2002). Where the cow herd performance data were used to make culling and selection decisions, beef cattle performance improved. One cooperator's cow herd started with an average 205-d adjusted BW of 445 lb and cow efficiency (205-d calf adjusted BW divided by the cow's BW times 100) of 46.5%. By year 5, the average 205-d adjusted BW and cow efficiency improved to 501 lb and 49.7%, respectively. This cooperator collected cow herd performance data even after completing the ABIP. After 8 years of cow herd performance, average 205-d adjusted BW and cow efficiency improved to 557 lb and 50.1%, respectively.

Although enrolling steers in the Arkansas Steer Feedout Program was a requirement for the ABIP whole-farm cooperators, not all farms participated. Three of 15 cooperators were purebred cattle operations, one cooperator was already retaining ownership to the feedyard, and six cooperators failed to participate in the Feedout program. Therefore, only five whole-farm cooperators participated in this program. One cooperator increased the percentage of cattle grading USDA Choice from 30 to 70%. Sire selection to complement his cow herd and using carcass EPD's as part of the sire selection process were the keys to improving the percentage grading USDA Choice.

Each cooperator was asked to record major production practices (weaning, fertilizer application, breeding season, etc.) implemented on the farm and the month they were conducted during year 1. In some cases, the cooperator was implementing proper management practices but at the wrong time of year. This was especially true with practices such as fertilizer application and weed control. Suggestions made by the ABIP team to change the timing of some practices resulted in a greater benefit from the respective practice. In addition to the initial documentation of when management practices were implemented, during the annual winter ABIP team visit, a projected plan for the coming year was developed that identified when management practices were to be implemented by month.

Implications

The Arkansas Beef Improvement Program is an integrated resource management educational program that demonstrated cost-effective beef cattle and forage management practices. It attempts to pull together fragmented management technology to aid in the decision-making process to achieve producers' goals. This educational approach provided was successful in improving beef production efficiency.

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