Search for Excellence in Livestock Production

Livestock Water Quality Program

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The Livestock Water Quality Program was a multifaceted project led by state specialists with significant Extension Agent involvement to address the needs of 1) North Dakota producers and 2) NDSU Extension personnel.

Providing adequate water to livestock is critical for animal health and production. Good-quality water can increase your cattle's intake and weight gain. The quality of water accessible to livestock is directly tied to the amount of forage they consume. All-natural water contains salts, which are dissolved minerals or solids. Elevated concentrations of total dissolved solids (TDS) and sulfates can be toxic to livestock. When runoff is low in the spring or during a drought, the salts in surface water become more concentrated as water concentrations decline, and can reach concentrations that are toxic. Water quality screening and analysis of livestock sources allows ranchers to ensure water quality is not impacting livestock performance and/or health. It also can aid in making management decisions such as when livestock should be removed from a pasture or when an alternative water source should be used or developed. Installing a water development plan can help ensure that livestock have access to good-quality water throughout the grazing season and increase a ranch's drought resilience.

While several agents have training in animal science, many do not, additionally livestock water quality is a minor component of animal science curriculum. Thus, there is lack the knowledge and confidence to engage with producers on these topics. In addition, Extension agents expressed a desire for programming that increased interactions with producers and provided information to enhance on-farm management.

Educational Objectives:

To address the needs of these two target audiences a program was developed with the following objectives:

- 1) Increase knowledge and understanding of Extension agents regarding water quality and the impacts it has on livestock health and performance.
- 2) Increase the interaction between Extension agents and producers in their county regarding livestock water quality.
- 3) Increase producers' knowledge and understanding regarding water quality issues that can impact livestock performance and health, increase producer screening and testing quality

livestock sources, resulting in reduced livestock losses due to toxic water condition and the development of alternative livestock water sources.

Program Activities & Teaching Methods:

This program was initiated based on a request from Extension agents during a program team meeting. Emails were sent to Extension agents to determine interest in a program focused on livestock water quality. TDS meters were purchased for agents interested in participating in the program. At the 2019 Range & Livestock In-service trainings (May) included a livestock water quality with hands-on TDS meter calibration. A protocol was developed and a training webinar for Extension agents was held in June to provide a project overview and provide specifics on project protocol and livestock water quality.

In 2020 a training webinar was held in April to introduce new participants to the program and provide updates to 2019 participants. Participating Extension agents submitted monthly water screening and photos. Data was reviewed for accuracy and compiled into monthly reports that were sent to agents to share with producers.

In 2021, the program was offered statewide through the Livestock Management and Natural Resource Management teams. A zoom update on the program highlighting the program results to date was held in February, followed by a training webinar in March to introduce new participants to the program and provide updates to past participants. The curriculum was introduced to agents at the Range & Livestock In-service Trainings in June.

Data was utilized in the development of Extension curriculum including: 4 Extension publication, 2 presentations, 3 videos, 18 reports and 10 news releases. Program results were disseminated by agents and specialist through farm visits with participating producers, face-to-face meeting, webinars, news and radio spots, news release, written reports and social media.

Results:

The seven trainings provided professional development to 110 participants. To date, the program material has been presented during nine webinars and at 34 producer meetings and tours to over 1,600 people.

This program directly involved 38 agents that sampled water sources in 39 counties in North Dakota. Extension agents screened 1,841 livestock water samples from 1,481 locations. TDS screenings identified 136 sources that may contribute to poor livestock performance (3,000 – 4,999 ppm), 146 with the potential to negatively impact livestock health (5,000 – 9,999 ppm), and 20 with deadly TDS levels (>10,000 ppm). Sulfate screenings (2021 only) identified 329 sources that may be toxic to livestock (>1,200 ppm). These screenings lead to 125 samples being sent for laboratory analysis. Management changes were made at 10 (24%) and 214 (65%) of the locations with water quality concerns in 2020 and 2021, respectively. Follow-up surveys indicated 28 of participants had installed a livestock water development. Results clearly demonstrate the impacts of this program accomplished the project objectives. We successfully increased producer knowledge and understanding, influenced their intent to make management

changes, resulting in management changes that benefit livestock health and performance. At the same time, we increased the knowledge and technical capacity of 38 Extension agents, enhancing their confidence, resulting in increased engagement with clientele.

Impact Statement:

Extension agents that attended in-service trainings agreed to strongly agreed the training increased their knowledge of livestock water quality with an average rating of 5.4 (where 1 is strongly disagree and 6 is strongly agree). Additionally, 100% of participants intended to incorporate the curriculum into their programing efforts. Extension agents' confidence to engage with stakeholders is reflected the total screenings (1,841), presentations (29), articles (50) and media interviews (25) on the topic.

The results of screening resulted in management changes, including additional monitoring of water sources, livestock being exclude or moved, water hauling and producers evaluating alternative water options at 224 locations. The screenings saved approximately 40,000 head of livestock and had the potential to increase health and performance of an additional 34,000 head. Follow-up surveys indicated 50% of participants intended to monitor water quality and/or install water developments and 28 participants had installed a livestock water development.

The data collected through this program was used to demonstrate drought impacts to livestock water availability and quality in 2021 to state and federal agencies, resulting in approximately \$7 million being allocated to livestock water improvement projects.

Evaluation:

A post-program evaluation was conducted following in-service trainings to compare pre and post-program knowledge, as well as, intent to use curriculum in programming efforts. A voluntary post-program evaluation was used to determine knowledge change and intent to change of meeting and webinar participants. Surveys were created to determine water related concerns of livestock producers involved in the monitoring program. In addition, a follow-up surveys of participating producers were administered to evaluate the intermediate and long-term impacts of the program. In addition to formal assessment methods we received many testimonials from many producers involved in the program. Due to requests from participating producers and concerns about lingering impacts of the 2021 drought, the program will continue to be offered statewide in 2022.