



ANNUAL REPORT

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1220 N Street, Sacramento, CA 95814
(916) 576-0300





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REPORT & PROGRAM SCOPE

2020 Annual Report

The California Department of Food and Agriculture (CDFA) Antimicrobial Use and Stewardship (AUS) program reports annually on the program's priorities and accomplishments. This AUS 2020 Annual Report focuses on the 2019 - 2020 fiscal year (FY 19 - 20), spanning July 1, 2019 - June 30, 2020. This report continues the practice of informing legislators and stakeholders about the program's progress towards its goal of becoming the leader in innovative approaches to antibiotic resistance and responsible antibiotic use associated with livestock in California.



The Antimicrobial Use & Stewardship Program

Following the passage of California Senate Bill 27 (SB 27, Hill), a first-in-the-nation law requiring veterinary oversight for all uses of medically important antibiotics in livestock, CDFA established the AUS program in 2017. The AUS program consists of a team of veterinarians, epidemiologists, and specialists working collaboratively to

preserve the efficacy of antibiotic drugs through a comprehensive antibiotic stewardship and monitoring program to meet the mandates of California's law, Livestock: Use of Antimicrobial Drugs (Food and Agriculture Code [FAC] Sections 14400 - 14408).



Like the experience of many stakeholders, FY 19 - 20 brought several unexpected changes and challenges for the AUS program and the State of California. COVID-19 has had far-reaching impacts; State employees, including AUS staff, have helped where needed. In addition to meeting AUS program goals, AUS' scientific and data review skills were applied to assist with emergency management and disease mitigation related to COVID-19. Furthermore, AUS was able to assist with epidemiologic evaluations during a major poultry disease outbreak in Southern California. AUS is proud of its contributions over the past fiscal year to support California's public and animal health and to enhance core staff competencies, in addition to fulfilling its current program objectives.

Among its many accomplishments this fiscal year, AUS sought a better understanding of antibiotic use in several livestock industries and started new collaborations to better serve California's diverse animal agriculture landscape, including a focus on beef and dairy cattle, commercial poultry, sheep, goats, and backyard production. Through current and ongoing projects, outreach, and partnerships with academic researchers, livestock producers, and collaborative agencies, AUS has continued to support animal health and a safe food supply.

The following sections in this report provide a description of the AUS program's work and accomplishments during FY 19 - 20. Additionally, high-level summaries of selected, ongoing projects are found in the Appendix at the end of this document.

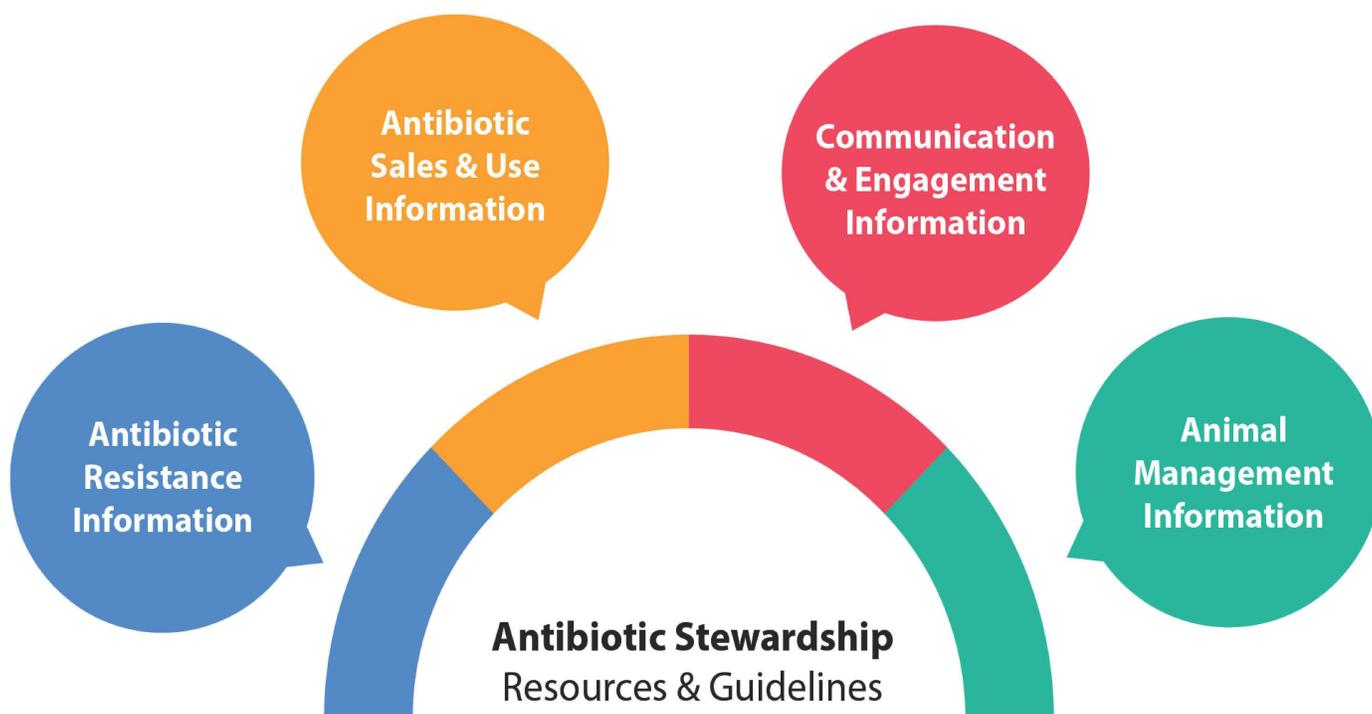


PROGRAM HIGHLIGHTS

Program Products

What materials and information have we produced?

The AUS program has created informative products to increase awareness and understanding of antibiotic stewardship. AUS materials present evidence-based information regarding the current use of antibiotic drugs and how to preserve antibiotic availability and efficacy. The voluntary participation of livestock producers and other stakeholders in our data collection, trainings, and outreach and engagement efforts contributes greatly to our current knowledge and informs our future direction to better serve California. Please refer to the Appendix for additional detail; more information will be provided in separate publications.





AUS Outreach & Engagement

20 presentations 
reaching over **673** people

388 farms engaged 
across **8** studies

395 
registered livestock drug
retailers visited



Antimicrobial Stewardship Planning Checklist

An aid to help veterinarians engage in conversation with their livestock producers regarding broad, non-species-specific health-related topics

Inspection Services VFD Summary Report 2019

Summary of veterinary feed directive (VFD) orders in California



Collaboration with USDA NAHMS 2019 Goat Study

25 field staff from CDFA collaborated with USDA to complete on-farm visits for the NAHMS 2019 Goat Study

Antimicrobial Stewardship During COVID-19 Pandemic

An infographic listing considerations for the continuation of antibiotic stewardship in livestock and providing continued support during the pandemic



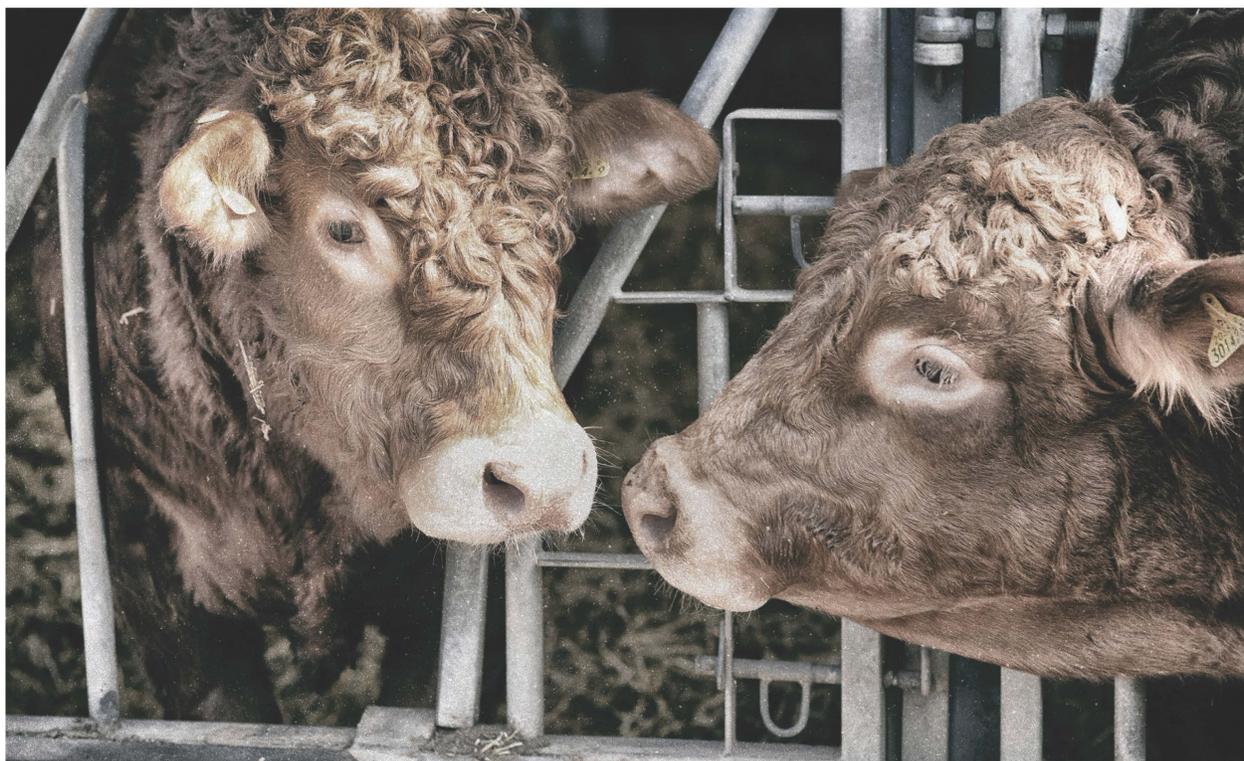
Online Restricted Livestock and California Prescription Drug Inspections

10 inspections of online retailers who sell livestock drugs to ensure compliance with California laws and regulations



Find AUS publications as well as scientific research papers resulting from AUS-funded projects on our **website**: <https://www.cdfa.ca.gov/ahfss/AUS/>

Above is a selection of highlights from the work AUS completed over FY 19 - 20; it is not comprehensive. Ongoing studies report results over a number of years; results presented here were compiled in FY 19 - 20.



Animal Management Strategies

Which health promotion and infection prevention practices are being used in California?

To better understand the animal management practices of California's livestock producers, the AUS program reaches out to stakeholders to keep up-to-date on current strategies. This ongoing practice helps identify how our program can assist California livestock producers in finding the best methods to impact antibiotic resistance, as well as opportunities for education and outreach. The AUS program partners with veterinarians and regularly reviews existing research to promote best management practices and sound animal health. The following infographics highlight AUS' work in this area over the past fiscal year.



Veterinary Involvement in Livestock Health

..... 2016

84% of
larger cow calf operations
surveyed used a veterinarian

more frequently than was
reported by smaller operations

..... 2017

over **50%** of
sheep operations
surveyed used a veterinarian

consistent across all flock sizes

..... 2018

92% of
dairies surveyed

reported relying on the
veterinarian for information about
antibiotics used to treat cows

92% of
dairies surveyed

confirmed having a valid
veterinarian-client-patient
relationship (VCPR)

53% of
dairies surveyed

reported participation in
dairy assurance programs

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Antibiotic Sales & Use

What antibiotics are sold and how are they used in California?

The AUS program gathers information on antibiotic use in food producing animals by working directly with retailers and firms to collect data on antibiotic sales and veterinary feed directives (VFDs) that have been issued for animals within California. The data on VFDs is a snapshot of the antibiotics that have been ordered for use by a licensed veterinarian in medicated feed for various species and indications. AUS VFD reports provide detailed information regarding VFD data collected and can be accessed on the AUS website. Results of these efforts and surveys of producers regarding their on-farm practices allow AUS to better understand the use of antibiotic drugs and develop relevant materials to promote antibiotic stewardship and judicious use practices. Highlights of AUS' work from the last fiscal year are illustrated in the following infographics.



Indications for Antibiotic Use

As Authorized in Veterinary Feed Directives (VFDs)

- Respiratory Disease (166)
- Gastrointestinal Disease (152)
- Both (288)
- Other (58)

**Number of VFDs collected for calendar year 2019. For more information, see AUS' VFD Summary Report. Above is a selection of highlights from the work AUS completed over FY 19 - 20; it is not comprehensive. Ongoing studies report results over a number of years; results presented here were compiled in FY 19 - 20.*



Antibiotic Use

Understanding how and why antibiotics are used is essential for antibiotic stewardship.



Backyard Producers

Veterinarian recommendation

continues to be the **basis for the decision to use antibiotics** for a majority of backyard livestock owners.



Dairy Cattle

Dairy farmers report increased use of

alternatives to antibiotic drugs starting in 2018 were also **more likely to** submit non-routine samples for disease diagnosis and report **making changes** to their practices in order **to control and prevent disease outbreaks.**



Commercial Poultry

Samples were collected

from broiler chickens and turkey flocks across California, resulting in *Salmonella* and *Campylobacter* isolates that will be **tested for antibiotic resistance** and **matched with antibiotic use data.**

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**TOP
3**

Diseases/ Disorders For Which Antibiotic Use Was Reported

Comparing Smaller Herd/Flock Sizes to Larger Herd/Flock Sizes Prior to 2018



LAMBS

- 1 Respiratory Disease
 - 2 Diarrhea
 - 3 Injury
- No difference** in use between flock sizes



EWES

- 1 Respiratory Disease
 - 2 Lameness
 - 3 Reproductive Issues
- No difference** in use between flock sizes
- Smaller flock** sizes were **less likely** to use antibiotics



PRE-WEANED CALVES

- 1 Pink Eye
 - 2 Respiratory Disease
 - 3 Diarrhea/Scours
- Smaller herd** sizes were **less likely** to use antibiotics



COWS & REPLACEMENT HEIFERS

- 1 Pink Eye
 - 2 Lameness
 - 3 Respiratory Disease
- Smaller herd** sizes were **less likely** to use antibiotics

This information on oral and injectable antibiotic use has helped guide literature reviews that will provide evidence-based resources on sustainable management practices for disease prevention.

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Antibiotic Resistance

How are we looking at trends in antibiotic resistance?

AUS continues to evaluate antibiotic resistance trends identified through analysis of both on-farm and clinical samples. The AUS program studies on-farm samples collected from the same operations over time to gain valuable insight on the effects of antibiotic use and other management practices on antibiotic resistance. AUS leverages existing sources for samples when available, including stored clinical samples, to describe historic and ongoing trends in the sampled populations. The following are highlights from AUS' work in this area during the past fiscal year. Please refer to the Appendix for additional detail; more information will be provided in separate publications.



Dairy Heifers

340 samples were collected across **6** dairies and multiple sampling periods from heifers with and without signs of bovine respiratory disease; both respiratory pathogens and enteric indicator bacteria were isolated for **ongoing testing of resistance characteristics**



Dairy Cows

1,154 fecal samples were collected from dairy cows resulting in **4,329** *E. coli* and *Enterococcus spp.* isolates that **showed a low rate of antibiotic resistance** to drugs commonly administered to adult dairy cows

.....
Studies showed that **antibiotic drugs commonly used** in adult dairy cows had **high susceptibility rates** among isolated indicator bacteria, suggesting that these drugs **may continue to be effective** in treating disease that occurs around calving time

Above is a selection of highlights from the work AUS completed over FY 19 - 20; it is not comprehensive. Ongoing studies report results over a number of years; results presented here were compiled in FY 19 - 20.



Commercial Poultry

Common antibiotic resistances observed across *Salmonella* isolates collected from commercial poultry flocks were **not statistically associated with antibiotics used on those farms**

Backyard Poultry



Metagenomic analysis is being performed on a selection of samples from backyard poultry, **exploring antibiotic resistance** broadly across the bacterial community in the backyard poultry environment



Goat Study

65% of California goat operations that completed Phase II of the **NAHMS 2019 study** participated in **enteric pathogen testing**, and **antibiotic susceptibility testing** will be performed on a subset of these samples which had the necessary bacteria present

CAHFS MICs



AUS funding helped support the CAHFS Laboratory to perform **1,125 MIC tests** for clinical samples submitted from **multiple livestock sources**

**Minimum inhibitory concentration (MIC)*

Above is a selection of highlights from the work AUS completed over FY 19 - 20; it is not comprehensive. Ongoing studies report results over a number of years; results presented here were compiled in FY 19 - 20.



Communication & Engagement

How are we reaching people and improving our efforts?

Continuous communication with and education of livestock owners, livestock drug retailers, and veterinarians are key parts of the AUS program. Feedback received through outreach informs AUS how best to reach and meet the needs of the wider audience we want to engage in further education efforts. The following highlights are from AUS' work in this topic area over the past fiscal year. Please refer to the Appendix for additional detail; more information will be provided in separate publications.

99% of dairy survey respondents were aware

that all uses of **medically important antibiotics in livestock required a veterinary feed directive (VFD) or prescription** and are no longer sold over the counter (OTC) in CA **since January 1, 2018**.

A majority of **backyard livestock producers** responded positively to receiving more **online & in-person training**

>55% of **goat producers contacted** for Phase II of the NAHMS Goat Study **agreed to participate**

Extensive groundwork on creating more access to continuing education on antibiotic use and stewardship provided for California veterinarians through

webinars & in-person presentations



Online Training

for livestock drug retailers is available
(Spanish translation is pending)

UC Davis researchers are **building on the information they learned** in backyard poultry studies **to create training materials** for veterinarians focused on antibiotic stewardship

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Looking Ahead

What's next?

As demonstrated in this report, AUS has accomplished much in FY 19 - 20 and is looking forward to continuing this success in FY 20 - 21. Several ongoing projects will have valuable results to report in the next 1 - 2 years. AUS continues to partner with researchers, producers, veterinarians, and other stakeholders to learn more about livestock-associated antibiotic resistance and to continue the promotion of animal and public health in California. The following highlights describe a selection of upcoming AUS projects anticipated for the next fiscal year.



Feedlot Studies

Expansion of the USDA National Animal Health Monitoring System (NAHMS) 2021 Feedlot Study and exploration of other opportunities to work with the CA feedlot producers



Commercial Poultry

A study of commercial poultry operations (broilers, layers, and turkeys) to assess the level of antibiotic susceptibility to medically important antibiotic drugs in *Salmonella*, *E. coli*, and *Campylobacter* isolates



Aquaculture Expansion

Explore opportunities to characterize the aquaculture industry in California and its current management practices, including antibiotic use



Commercial Sheep Stewardship

Study best management practices and focus on top 3 diseases present on-farm to positively impact antibiotic stewardship implementation in sheep operations



Stewardship Guidelines & Best Practices for Beef Quality Assurance

Collaborative effort by industry experts to address the top three disease challenges for cow calf livestock producers



Antibiotic Resistance & Stewardship Education Opportunities

Continuing Education in coordination with UC Davis and Washington State University for veterinarians and livestock producers



VFD Collection

Continued collection, reporting, and analysis of VFD orders



Community of Practice

A professional development strategy to improve on-farm decision-making and use of antibiotics in animal agriculture



Antibiograms

Exploring the development of antibiograms to inform judicious use of antibiotics and monitor antibiotic resistance trends

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GETTING INVOLVED & ACKNOWLEDGEMENTS

How to Get Involved

Participation in AUS surveys and studies is voluntary! Your participation in our efforts to gather information is essential to the program's success and ensures that the program's work reflects what is currently happening with California livestock. If you receive a survey or an invitation to participate in one of our on-farm studies, please consider participating! Your participation provides valuable information that the program incorporates into publications and recommendations, impacting California agriculture. Additionally, engagement with and feedback on our stewardship materials is crucial to ensuring they meet the needs of veterinarians and producers. With a goal of creating easy-to-apply resources, AUS stewardship looks forward to future engagement opportunities. Antibiotic resistance is a threat to both human and animal health. By working together, we can find ways to minimize the risk and preserve the effectiveness of antibiotics for the future.



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For more information on the AUS program or to **download our educational materials**, please visit <https://www.cdfa.ca.gov/AHFSS/aus/>



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If you have **feedback** or would like to keep in touch, contact us: cdfa_aus@cdfa.ca.gov



Acknowledgements

This past fiscal year was successful thanks to the dedication and support of many individuals and organizations. The AUS program would like to thank everyone who contributes to our progress. Our advisory boards and stakeholders play a key role in providing guidance and support at all stages of our research, outreach, and education efforts. Veterinarians, livestock owners, and other stakeholders are crucial to our success as they continue to participate in our studies and promote our outreach materials. We would also like to extend our gratitude to all the researchers who share their expertise with us and work each day to help us accomplish our goals.

Special Thanks

AUS would like to give special thanks to the following individuals who contributed to this annual report:

| | |
|--------------------------|---|
| Dr. Sharif Aly | <i>University of California, Davis</i> |
| Dr. Kris Clothier | <i>California Animal Health and Food Safety Laboratory System</i> |
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| Dr. Fernanda Ferreira | <i>University of California, Davis</i> |
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| Dr. Ashley Hill | <i>California Animal Health and Food Safety Laboratory System</i> |
| Dr. Gaby Maier | <i>University of California, Davis</i> |
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| Dr. Randall Singer | <i>University of Minnesota</i> |
| Project Staff | <i>NAHMS Goat 2019 Study</i> |

APPENDIX

The following pages represent high-level summaries of a selection of the studies and projects supported by AUS during FY 19 - 20. These include information regarding the purpose, design, impact, and progress for each project. Summary findings are described where appropriate, dependent upon project progress. These summary documents are intended to provide detailed background information and progress updates for AUS' varied efforts and do not represent final reports or results for the studies included. Additionally, please see AUS' 2019 Annual Report for detail on studies initiated in previous fiscal years.



I. Bovine Respiratory Disease in Dairy Heifers

Prevalence of in-vitro phenotypic and genotypic antibiotic resistance in respiratory bacterial isolates from weaned dairy heifers in California with and without respiratory disease and the association with farm level management variables and enteric bacterial minimum inhibitory concentrations

Questions: What are the resistance profiles of respiratory and enteric bacteria isolated from weaned dairy heifers in California? Is there a relationship between resistance profiles of respiratory bacterial isolates and enteric isolates? Do the resistance patterns in either type of bacteria correlate with farm variables or antibiotic treatment history?

Significance to CA: Antibiotic use in livestock is a focus of national and state policies, including California's efforts to promote antibiotic stewardship. As the largest dairy-producing state in the US, better understanding of disease management and antibiotic resistance in California's dairy heifers is essential.

Research Team: UC Davis investigators with extensive experience in dairy cattle medicine, infectious disease, and management practices. Members of this team have conducted numerous surveys with cattle producers.

Summary: UC Davis researchers enrolled California dairies in a study where they collected information on antibiotic use and other farm management variables, in conjunction with biologic sampling, to study antibiotic use, antibiotic susceptibility, and animal management practices related to bovine respiratory disease (BRD) in dairy heifers.

Study Progress: A total of six dairies were enrolled in the study and farm-level data was collected through a survey investigating dairy characteristics, including information related to animal housing, vaccine practices, and other management factors. Animal treatment records have been collected from sampled animals and herd cohorts on farms where this data is available. Calf-rearing facilities enrolled range from home-raised calves to large, specialty, multisource calf-rearing facilities.

On each of the farms, calves were assessed for signs of BRD using a validated calf BRD scoring system developed previously by some members of the study team. Calves were sampled over two seasonal sampling points (spring / summer and fall / winter), collecting deep nasopharyngeal swabs for selective isolation of respiratory pathogens and rectal swabs for selective isolation of enteric marker bacteria. Swabs were tested for respiratory bacterial pathogens (*Pasteurella multocida*, *Mannheimia haemolytica*, and *Histophilus somni*) and enteric bacteria (*E. coli* and *Enterococcus spp.*). Across the sampling periods a total of 340 samples were collected, and bacteria were isolated for phenotypic susceptibility testing. Metagenomic analysis of samples will also be performed. Analysis of the biological sampling and survey results is ongoing.

How This Helps AUS: This study provides information on antibiotic use and current susceptibility trends related to BRD in weaned dairy heifers in California, helping further the Department's understanding of industry needs and priorities. These findings will help in generating evidence-based outreach materials to promote the judicious use of antibiotics and contribute to efforts to monitor trends in California.

Next Steps: The investigators intend to communicate the findings of this study with the scientific community through peer-reviewed publication and presentations at scientific meetings, as well as with other interested parties in the industry through producer-oriented meetings and communications directly back to participating herd personnel. The findings of this study will also feed directly into AUS monitoring and stewardship activities.

II. Tool for Maximizing Decision-Making for Mastitis Scenarios On-Farm

Development of an economic tool to optimize mastitis management programs in California

Question: What is the economic feasibility of implementing selective dry cow therapy in California? Is there an opportunity to reduce antimicrobial use without financially hurting the producers and while maintaining cow health and welfare?

Significance to CA: California is responsible for approximately 20% of all milk produced in the US; therefore, antibiotic stewardship tools and practices targeted towards the dairy industry in the State have a huge potential national impact. Currently, there are no adequate tools available to get insight into the economic consequences of mastitis. Studies describing and evaluating the consequences of a mastitis management program would improve decision-making at the farm level by providing insight to the specific costs and risks of mastitis during lactation and at the dry-off in California. This information can be used by farmers, veterinarians, and other consultants to help their decision-making process, therefore minimizing the costs associated with their mastitis programs, especially if it allows the simulation of potential future scenarios.

Research Team: A university veterinarian with a focus on dairies and economic specialist at the UC Davis School of Veterinary Medicine, Center for Population Health and Reproduction, as well as an international collaboration with a European research group, will build on the current level of knowledge and apply it for the benefit California dairies.

Summary: The project is designed to help farmers and veterinarians take the abstract terms of antimicrobial use, economics, and animal health metrics and apply them to a more comprehensive picture within a farm, using real husbandry and economic data.

Study Progress: Data collection, analysis, and summarization models for both subclinical and clinical mastitis will be completed this summer. Outreach to dairy veterinarians through in-person presentations and webinars is ongoing, and a collaboration with veterinarians and University of California's Cooperative Extension is underway to field test tool efficacy on five different farms. A Spring workshop hosted via Zoom took place, in collaboration with other researchers.

How This Helps AUS: The results of this project will help CDFA better discuss challenges to adopting new technology and allay fears of unknown farm impacts by simulating the proposed changes on-farm. This project will use specific existing data from California dairies such as somatic cell count, incidence risks of subclinical and clinical mastitis, and treatment costs to discuss changes in practical terms. By providing an easily accessible model to understand the full ramifications of alternative strategies for mastitis management on-farm, CDFA can better understanding the unique challenges that face the California dairy industry and empower dairies to employ best practices.

Next Steps: The researcher will continue to focus on developing an online economic tool in the coming year. This research will also be highlighted in a national dairy-focused publication. Once the tool is complete, the researcher will facilitate workshops for farmers and dairy veterinarians to better understand the online tool and its opportunities and limitations. Lastly, the researcher is seeking publication in a national peer-reviewed journal.

III. Stewardship Guidelines and Best Practices for Beef Quality Assurance

A collaborative effort by industry experts to address the top three disease challenges for cow calf livestock producers, as directed by FAC 14404

Question: Based on current management practices and the prevalence of the most important diseases among cow calf raising operations, what scientifically validated materials can be produced to support the antimicrobial stewardship guidelines for use by veterinarians and producers specific to scours, bovine respiratory disease, and pinkeye?

Significance to CA: California raises an estimated 1,570,343 beef cattle and calves, with 10,254 ranches across the state (NASS 2017 Census). Beef is an important livestock industry in California, with many operations being cow calf ranches. In order for AUS to develop practical and evidence-based guidelines and materials, it is essential to understand how antibiotics and veterinarians were utilized by cow calf producers prior to the 2018 changes in antimicrobial use law. This information will be used to promote and monitor progress toward closer relationships and improved antimicrobial stewardship moving forward.

Research Team: A university veterinarian with an expertise on cow calf operations at the UC Davis School of Veterinary Medicine, Department of Population Health and Reproduction in collaboration with team of representatives from key areas that include CDFA staff, California veterinary experts, and California cow calf industry experts.

Summary: In collaboration with a focus group of California cow calf production experts who are knowledgeable on relevant diseases in beef cattle, the University is developing materials that promote best practices and antimicrobial stewardship with regards to three important health challenges in cow calf operations. Materials produced will be based on data collected during the AUS 2017 Cow Calf Survey, on reviews of the literature applicable to California cow calf production, and on recommendations made by a focus group of experts in the matter.

Study Progress: A systematic review of the literature for two proposed health challenges (scours and bovine respiratory disease) is in progress. Data extraction from literature for the pinkeye health challenge is being performed. Data will be reviewed and summarized in the form of scoping reviews for the formulation of best management practices for veterinarians and cow calf producers.

How This Helps AUS: The materials created by this project will close gaps within the existing Beef Quality Assurance programs by creating best management materials related to three important diseases in cow calf operations. It will help AUS provide veterinarians and producers with scientifically validated tools to promote antimicrobial judicious use and stewardship principles.

Next Steps: During the next reporting period, the researcher will complete the literature review for pinkeye. Work on bovine respiratory disease is ongoing. Data extraction for the second health challenge, scours, should be completed soon after.

IV. Commercial Sheep Stewardship Project

A collaborative effort by industry experts to address the top three disease challenges for commercial sheep producers, as directed by FAC 14404

Question: What scientific interventions and approaches can commercial sheep producers in California use to reduce disease pressure in their flocks and therefore, decrease the development of antimicrobial resistance?

Significance to CA: California has the second-largest number of sheep in the nation and ranks #5 for the number of sheep operations nationally (NASS 2017 Census). Better understanding of antimicrobial use and animal health management practices on sheep operations will inform development of best management guidelines and judicious use principles for sheep producers and their veterinarians.

Research Team: Chico State University sheep specialist, a focus group comprised of industry and veterinary members, with support from California Wool Growers Association (CWGA) and the California Sheep Commission.

Summary: The University is developing materials that promote best management practices and antimicrobial stewardship with regards to three important health challenges in sheep operations in California.

Materials produced will be based on data collected during the 2018 Commercial Sheep Antimicrobial Use and Stewardship Survey, on reviews of the literature applicable to California sheep production, and on recommendations made by a focus group of experts in the matter. This is especially important as our research survey results show less than 18% of sheep operations use the national quality assurance program. Interventions such as workshops and disease-specific, science-based guidance that are directly relevant to rearing sheep for meat and/or wool here in California have the potential to significantly reduce antibiotic use and disease occurrence.

Study Progress: Although delayed by impacts of the COVID-19 pandemic, the researcher is establishing meetings with the task force; and, conducting in-depth review of the literature. The researcher is currently gathering articles for the literature review of the three health priorities identified by the AUS survey.

How This Helps AUS: This project is the action and intervention portion of our commercial sheep survey from fiscal year 2018 - 2019. By leveraging the problems and opportunities identified, AUS hopes to create evidence-based educational materials and guidelines. Through literature review, educational material development, as well as a follow-up best management practice- focused survey, we will clarify what we know about antimicrobial use in sheep and focus on areas to create real change.

Next Steps: The researcher will develop a survey to identify best management practices that will be administered to a more focused group of producers. They will then evaluate and organize the survey data. The researcher will simultaneously be reviewing articles for meta-analysis, which will be completed Spring 2021. By thoroughly examining the gaps in literature that prevent progress in reducing disease prevalence on farms, the researcher will develop a sheep “research needs summary list” to highlight opportunities for novel research projects to promote judicious use of antimicrobials in California. Lastly, they will develop fact sheets for three primary health issues for sheep and develop a web-based instructional module for best production practices for producers.

V. USDA National Animal Health Monitoring System (NAHMS) 2019 Goat Study

Nationwide study of U.S. goat operations to provide information regarding animal health and management practices

Question: What are the most important health issues facing the U.S. goat industry and what are the health management practices used, including antibiotic use practices?

Significance to CA: The California goat industry is an important part of the state's agricultural landscape. NAHMS studies are nationwide and typically report results by region, rather than by state. AUS collaborated with USDA National Agriculture Statistics Service (NASS) and NAHMS to expand the 2019 Goat Study in California to obtain a representative sample from the state.

Research Team: A NAHMS team comprised of veterinarians, epidemiologists, and statisticians with long-standing experience conducting studies of this nature.

Summary: A two-phase study in line with previous USDA research: Phase I involves a general management survey of goat producers administered by NASS and Phase II involves a more in-depth NAHMS survey with biological sampling. CDFA provided funding to expand Phase I and provided personnel to help conduct Phase II. This study is designed to gather valuable information on the U.S. goat industry, including management practices associated with important goat diseases. The study will also describe antimicrobial stewardship on goat operations and estimate the prevalence of enteric pathogens and antibiotic resistance patterns.

Study Progress: Phase I of the study began July 1, 2019, Phase II began September 9, 2019, and all data collection in California concluded May 1, 2020. Two hundred CA Goat producers completed Phase I of the study. Nearly 50 field staff from CDFA Animal Health Branch and USDA Veterinary Services from across the state collaborated to complete the Phase II on-farm visits. Over 55% of goat producers contacted for Phase II of the study participated. Biological testing was conducted for most of these operations, with 65% of Phase II operations participating in enteric pathogen and antibiotic susceptibility testing (if the necessary bacteria were present in samples submitted). Analysis of study information and findings is ongoing.

How This Helps AUS: This collaborative study not only fulfills the mandate of FAC Section 14405(b) to avoid duplication of monitoring efforts, but also allows AUS to obtain information that is representative of the goat industry in California and can be compared with national-level results reported by NAHMS. The findings from this study will help AUS develop appropriate antibiotic stewardship guidelines and best management practices for the goat industry.

Next Steps: CDFA will finish delivering individual biologic testing results back to the participating goat producers in California. As NAHMS analyzes the data, information will be shared with AUS as appropriate. AUS will await the results and use them to serve the goat producers in the state.