VOL. 2 ISSUE 1 · FEBRUARY 2022

CATTLECAL NEWSLETTER

ANNOUNCEMENTS

Welcome to the CattleCal newsletter for February 2022! In this issue we have exciting information on diets for cattle transitioning from grazing to the feedlot, the career and research of Cal Poly San Luis Obispo professor Dr. Zach McFarlane, and a look at a study examining the effect of level and source of supplemental fat on feeding values of finishing diets and performance of feedlot cattle. If you would like to hear more detailed conversations about the articles in this issue, look for our CattleCal podcast on Spotify. Descriptions of this month's episodes and a link to the podcast can be found on page 3. If you have any questions, comments, or would like to submit a question for our Quiz Zinn segment, feel free to contact us. Our contact information can be found on the last page of the newsletter.

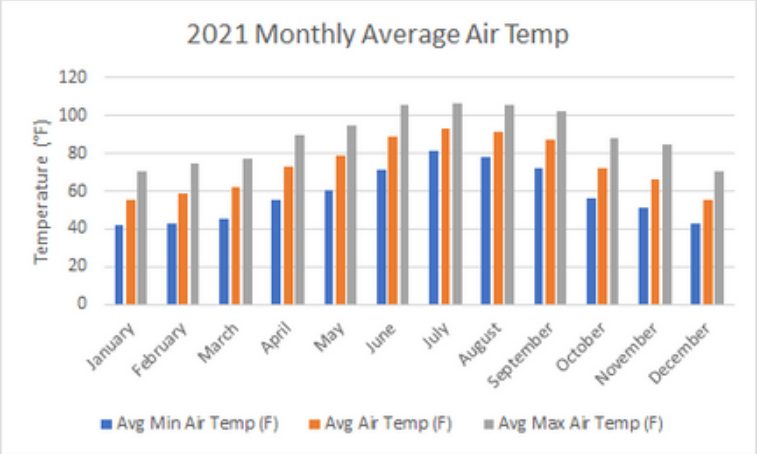
This issue:

THIS MONTH IN RESEARCH

In December we finished our two trials. We collected final weights and carcass data. Below is the summary of the overall performance of the cattle. We will be running statistics and writing up the results for future newsletters. We look forward to more studies starting in late January 2022 looking at crossbred Holstein steers.

OVERALL PERFORMANCE SUMMARY

Body weight (d 0)	284 lbs
Body weight (d 314)	1375 lbs
ADG	3.47 lbs/d
DMI	18.0 lbs/d
F:G	5.19
Ribeye Area	12.5 sq. in.



January 2021

December 2021

THIS MONTH IN RESEARCH

We also brought a new load of cattle in to start some 2022 research projects. This year we brought 120 Holstein steer calves and 120 crossbred (Angus x Holstein) steer calves. We will compare the performance of the two groups to see how they perform. We will also be testing tannins and programmed feeding with this group. Our studies began in late January 2022.

INCOMING CALF SUMMARY

	Holstein	Crossbred
Body weight (d 0)	278 lbs	294 lbs
Average age	122 days	159 days

Holstein
January 2022

Holstein x Angus
January 2022

CATTLECAL PODCAST FEBRUARY EPISODES

Quiz Zinn

In this episode, we asked Dr. Richard Zinn about transition diets for cattle moving from grazing to the feedlot.

Career Call - CCP#042

This week Brooke Latack and Pedro Carvalho called Dr. Zach McFarlane. Dr. McFarlane is an Assistant Professor, Beef Cattle Production Specialist at Cal Poly. In the current episode, Dr. McFarlane talked about his background in the beef industry and things that he did in graduate school to help him to be where he is today.

Research Call - CCP#043

This week Brooke Latack and Pedro Carvalho speak to Dr. Zach McFarlane again to discuss his work with the Cal Poly Bull Test and his research related to the bull test.

Feedlot Research Call - CCP#044

This week, Pedro Carvalho and Brooke Latack discuss research looking at the effect of level and source of fat supplementation on finishing diet feeding value and feedlot cattle performance.

Listen on Spotify at this link:
https://open.spotify.com/show/6PR02gPnmTSHEgsv09ghjY?si=2zV59nGbSE2mf8DiOqZLhw

Have any questions, comments, or suggestions? Want to send in a Quiz Zinn question? Contact the creators through the below email or through their social media profiles.

- Email: cattlecalucd@gmail.com
- Website: cattlecal.sf.ucdavis.edu
- Instagram: @cattlecal

QUIZ ZINN

What would be some recommendations for the diet of cattle moving from pasture to feedlot once they get to the feedlot?

This is always a really important question. One of the most evaded aspects of the feedlot cattle management is the receiving program. One of the problems that you have to remember is that when cattle come into the feedlot, even if the pasture is very close, there's a lot of uncertainty about the origin of the cattle and what the background of these animals are coming into the feedlot. Some cattle may already know how to eat out of a feed bunk because they may have been feeding supplements out on pasture. Other cattle are coming from very marginal pasture conditions and in very poor flesh. Some cattle are coming into the feedlot in very good flesh. All of these things create a real challenge for the feedlot. These large feedlots may be getting 1,000-3,000 head of cattle per day. They're bringing them in from all of these different origins and they have to standardize their receiving program. It's not easy for them to have various types of receiving programs. You have to consider all different incoming weights of cattle like yearlings, calves, or long yearlings. You have a whole bunch of diversity in terms of that. The biggest challenge with the cattle coming in besides health would be their familiarity with the feed bunk and their stress status, or the amount of stress they've experienced before coming into the feedlot.

Receiving Programs

What we want to do as we look at bringing cattle in is develop a receiving program where we move the cattle toward their finishing diet in such a way that the cattle are full before we begin moving them too far down into the high concentrate finishing diet. There are a lot of different approaches in doing that. The idea is to work things so the adaptation of microbes in the rumen, feeding behaviors, all of these things come together in an optimum way. Typically, receiving diets will have a minimum of 20% to a maximum of 30% forage NDF. The reason is to stimulate rumination and salivation as the rumen begins to adapt. What we would do is start out with a very high forage level. I gave you a range of 20-30%. The reason for that is that feedlots will have different approaches depending on the design of the feedlot, feed mill capacity, and other aspects. Generally speaking, either a two, three, or four diet program would be most common.

Three-diet program

In this program you would have a receiving diet with 20-30% forage NDF (on a dry basis) and top dress with about 1 kg (2.2 lbs) with the coarse forage. That brings up the total forage in the diet to about 45-50% forage. The cattle will see the forage and it will attract the cattle to the feed bunk. This is a common program in many large feedlots. You would keep them on that diet for about 7 days. If they're very light, then feed this diet for longer. During this period you will want to make sure the cattle are eating. After about a week, you would move to the #2 diet. This diet would have about 15% forage NDF. We would feed that diet for two weeks. This diet won't limit animal performance, so we can optimize average daily gain.

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We want to make sure that by 10 days they're eating. We may need to take all of the drawn animals that aren't eating out of the pen so we can get them full before we move on. By 21 days on feed, you would move them to the finishing diet.

Four-diet program

I recommend this program especially to operations where it's more difficult to control everything. The less control we have, the more conservative we should be. You would start out with the 45% forage (dry matter basis) diet. You would keep them on that diet for a week. You would then move them to a 35% forage (dry matter basis) diet for a week. Then you would move them to a 20% forage (dry matter basis) diet for a week. Then you would move them down to your finishing diet. This would be my highest rated option. This gives them a lot of time to get onto the finishing diet.

Three-diet (sandwich) program

Another common program that I do not recommend is the sandwich program. This is a two-diet program where you would start out with a receiving diet with 55% forage (dry matter basis) and then you would have your high concentrate, finishing diet.

- First 4 days: Feed the receiving diet with a morning and afternoon feeding.
- Days 5-7: Cattle would get the high forage diet in the morning (55% of daily intake) and the concentrate diet in the afternoon (45% of daily intake).
- Days 8-10: Cattle would get the high forage diet in the morning (45% of daily intake) and the concentrate diet in the afternoon (55% of daily intake).
- Days 11-13: Cattle would get the high concentrate diet in the morning (55% of daily intake) and the high forage diet in the afternoon (45% of daily intake).
- Days 14-23: Continuously increase the amount of high concentrate being fed (65% then 75%, etc) and reduce the amount of the high forage diet being fed until cattle are completely on the high concentrate finishing diet.

It's a gradual reduction of the receiving diet and increase in finishing diet over 23 days. This program greatly simplifies mill operations. If mill capacity is limited then the would allow you to get a lot of cattle fed. The big problem is that it is very difficult to call feed on cattle in the early receiving period. The feed intakes are moving at different rates. It is just very difficult to call feed. When you look at proportions of the receiving and finishing diets as a percent of intake, these things can get very confusing. It might work well for one pen, but for another pen they may all of suddenly have a lot of feed leftover and you don't know which diet it is. It complicates things. As I look at performance of feedlots, I have seen a decrease in average daily gain in cattle fed on the sandwich program.

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QUIZ ZINN

Crude Protein

There is a lot of research to show that the receiving diet should be high in protein. Usually the receiving diet will have 15.5-16.5% crude protein. In order for the animals to adapt to urea, the receiving diet shouldn't have more than 0.5% urea. A lot of nutritionists put 0.2-0.5% urea even if they don't need it just so we can adapt the animals to the non-protein nitrogen source.

Calcium

A typical finishing diet would have 0.6-0.7% calcium, though our finishing diets are closer to 0.8% calcium. The receiving diet should be higher and have at least 0.8% calcium.

Potassium

Typical feedlot diets have 0.5-0.6% potassium on a dry matter basis. The receiving diet would typically have between 0.9-1.2% potassium. We need to increase the potassium. That seems to have a positive effect on performance of the calves.

Pre- and Pro-biotics

Probiotics usually are beneficial to calves in terms of morbidity. You see some benefit of including a probiotic or prebiotic of some type in that early receiving program.

Zinc

The NRC would suggest 30 mg/kg supplemental zinc, but in the receiving diets nutritionists often increase that to 0.6-0.75% of zinc. We don't do that, but that would be common in the industry. In my experience, I don't see a lot of benefit in increasing trace mineral content in that initial 3-4 week period.

Fat

We will usually introduce fat into the diet at around 2% on a dry matter basis even if we will go higher in the finishing diet later.

Animal Health

The big issue you will have during that time is monitoring animal health. As cattle come onto feed, their feces will get loose. A lot of people might be concerned about that, but that's a mechanical type of diarrhea and is not any kind of problem unless it's coccidiosis where blood would be in the stool.

CAREER CALL WITH ZACH MCFARLANE

This week we spoke to Dr. Zach McFarlane, a beef cattle specialist at Cal Poly, San Luis Obispo.

Where are you from and what you do?
My name is Zach McFarland. I'm originally from Gridley, CA, a small farming community north of Sacramento. Those of you from Northern California are probably familiar with that area. It's in Butte County, very close to Chico State, actually. And now I'm currently at Cal Poly, San Luis Obispo. I'm the beef cattle specialist here.

Have you always worked with cattle? How did you decide to get an animal science degree?
Both sides of my family, my father's family and my mother's family, were involved in the ranching business. My mom's family had a ranch in Stonyford, California that unfortunately was sold prior to me being born, but we retained our roots in that community. Some of my cousins have an operation up in that area of California. My dad was a ranch manager for his entire life and for me that was a great opportunity to get involved in beef cattle production. I was always wanting to understand why we perform certain tasks, why we were doing certain management techniques. Originally, like a lot of students, I thought I wanted to become a veterinarian, particularly a large animal veterinarian. I know a lot of students that I teach currently have a very similar goal in terms of their long-term career goals. But I was very fortunate to have some great mentors in high school. I grew up raising cattle (steers and heifers), trying to start my own little herd before moving on to college. I also had some great mentors in undergrad at the University of Arizona that led me to being more involved in beef cattle production. Originally, I wanted to do something different. I wanted to be different. I didn't want to do the same old thing. But cattle have always been a part of my roots and so it was exciting to learn about the science behind beef cattle production. That's really what drew me toward a career in research and teaching.

Why did you decide to go to the University of Arizona?
I really wanted to get far away from home. I wanted to do something different. I focused a lot of my applications for my undergrad out of state. For whatever reason, I applied to a couple different extremes: Montana State University and University of Arizona. About as exact opposite as you can be in terms of climate, but I really wanted to try something different, particularly for animal science and beef cattle production. Understanding beef cattle production in multiple different environments and production systems is one of the things that really drove me toward the career that I have. The way we raise cattle throughout California is drastically different and highly variable based on what region of the state that you're located in. Arizona is incredibly different. When I went to Tennessee, it was a totally different environment. It was about changing my environment and getting out of my comfort zone. Fortunately for me, I do have family in Arizona that I was able to rely on. It was a great experience to try to have a completely different experience.
When I got to school I threw myself into all different organizations. I was on the rodeo team. I was in the collegiate Cattle Growers Association. I was on the leadership team. I started getting involved with some of the great faculty that have now either passed on or moved on to different careers.

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CAREER CALL WITH ZACH MCFARLANE

Dr. Roy Ax when he was at Arizona he took me under his wing. Drs. Elaine and John Marchello took me under their wing and exposed me to research, particularly beef cattle research. That was my first glimpse into maybe vet school is not being the appropriate career path for me. It took me a while to realize that. It was probably my senior year before I realized that vet school can be an option, but it wasn't necessarily the right option for me. I wanted to push my comfort zone, so I did an internship with the Radakovich cattle company in Iowa. That was a great experience and they actually sent me to one of their veterinarians to start learning the in's and outs of veterinary practice in a large animal setting. Iowa was a great opportunity for that. That was my first exposure to the swine industry. I took about a year working in this align industry to realize this was definitely not my passion. Beef cattle production called me home. I talked to my mentors at Arizona and they were able to help me pursue a Master's degree more focused on meat science and animal nutrition. That for me was a shift in gears. It was a great experience, but I realized that grazing cattle and the cow-calf sector were really what I cared the most. My focus was on cull cows and the food safety/meat science side of animal science. It was a complete shift for me when I transitioned to my PhD.

How was taking a year off to work in the Iowa swine industry?

That year there was a lot of growth, particularly in maturity, but also in the motivation level. Taking that break was the reason why I continued. A lot of people asked why I would start making money and then go back to school. I was very fortunate that I had a graduate assistantship. I got a lot of teaching experience while I was a master's student and I involved myself in a bunch of different labs so I was able to gain experience in different areas to really find out what exactly I wanted to do. I did some work on the molecular side and realized that's probably not for me. I think there's a lot of value in that, but I'm definitely more of an applied scientist. That was a great experience for me and the motivation alone was critical for me to be successful. That year break was just enough.

Why did you decide to go all the way to Tennessee and work with reproduction?

When I worked with Dr. Faulkner at Arizona, he encouraged me a lot. He said there's so many more experiences that you can get. I could have easily stayed in Arizona. I think that would have been the biggest mistake of my life. I went to NCBA (the National Cattlemen's Beef Association convention) every year as an undergrad and grad student. I tried whatever I could to get there. And truthfully, that was what got me to where I am today. It's that constant pursuit of networking opportunities. When I was at NCBA I was running the booth for the University of Arizona, meeting new people. I kind of shopped around since a lot of the large schools were there. I started talking to Auburn University, University of Tennessee, University of Arkansas, Texas A & M University, Kansas State University trying to find the right program for me. One of the things that I was taught from my mentors is that you have to find the right person. It's not so much about the university itself or the specific animal science program. I was very fortunate to meet Dr. Neal Schrick the department head at University of Tennessee. He took me to breakfast and said he wanted to introduce me to a couple faculty at Tennessee all focused on beef cattle production. I got to meet quite a few people. One of those being my future mentor Dr Travis Mulliniks.

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CAREER CALL WITH ZACH MCFARLANE

He had a five year project focused on heifer development, so his research program really triggered my interest. We had a lot of similar to experiences and background. His Master's and PhD were at New Mexico State University and he also worked at the research station in Fort Keogh, the USDA research station, for Dr. Mark Peterson. His experience level and his background and ideas were really a great fit for me. I knew I wanted to go to the South because I wanted to focus on grazing beef cattle. I had the experience growing up in in the western United States, but we all know the Southeast in terms of beef cattle production is very different in many ways. Frustratingly different for someone that was from California, I always joke. I did a lot of extension programming and teaching while I was at Tennessee, and I always joked that I told people I was from Arizona because the minute they heard I was from California, they immediately shut down. We're the largest agriculture state and top five for beef production. It's interesting that they would not favor somebody from California. We changed that attitude pretty quickly. At least I hope so. That was a huge wake up call for me. Transitioning from the western United States where we have to be so creative with beef cattle production to a completely different environment where they have nine months of grazing and high precipitation levels. It was just a fascinating experience to transition from a drought stricken region to a state where their most historic drought was when I first arrived. It was like 85 days without rain. Just another day in the office in California. For them it was a drastic reduction in precipitation level. It was a great way for me to learn about beef cattle production in an entirely different environment in an entirely different production system than what I was used to. It was to get myself out of my comfort zone.

Why did you choose to go for your Master's and PhD? Were you thinking of becoming a professor or going with the flow?

I think it was a little bit of both. When I started my master's I thought it would be great for my vet school application. Within the first month I realized how passionate I was about research and teaching. In particular, finding the solution as opposed to fixing the problem. It's a different mindset and I wanted to be involved in research. Not that you can't be as a veterinarian. That's certainly not true. For me personally, I wanted to lead research. I wanted to do research that wasn't focused on animal health but was more focused on grazing management and rangeland management. The interaction between nutrition and reproduction is so fascinating to me. That's really what changed my perspective on whether to transition to vet school or to a PhD program. I knew in my first month of my Master's that I definitely wanted to continue on. I wanted to become a professor someday. Originally, I wanted to do research and extension. Fortunately for me, I'm able to be engaged in research, teaching, and outreach at Cal Poly. It's a great fit for all of my interests.

What was it like deciding to come back to California?

I get asked this a lot. California has always been home, but you know it wasn't about being home. I had some really great job offers from other institutions that it was really hard for me to turn down. A lot of my family went to Cal Poly. I was the ugly duckling that did not go to Cal Poly or stay in California. The potential was what really drew me to Cal Poly.

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The facilities are great. We have a fairly brand new meat processing center, animal nutrition center. There was so much potential for me to build a program. That is what drew me back to California. Of course, having my family a lot closer was a draw for me, but it was not the final draw. If anything, that was not even included in my decision. I found that teaching was my true passion because you can play a role as a mentor. There's nothing more cool than seeing the success of the graduate and undergraduate students you mentor. I would rather them receive all the accolades in the world. That's what's so rewarding about this position. Working in academia, with all its frustrations, is also very rewarding.

What do you do on a daily basis in your position?

The majority of my teaching appointment is focused on beef cattle production courses. I teach an introductory course as well as an advanced beef production course. I also teach our principles of animal science, which is our freshman class in the fall quarter. I also run the bull test enterprise. We have bulls brought in generally the 1st of May and then they stay all the way through the summer until our annual sale the first Sunday of October. We just celebrated our 65th anniversary this year in 2021.That is probably one of the best opportunities for me as a faculty member to be engaged in teaching. Of course, I have students that run the bull test. Student managers and student feeders. They're staying all summer long and feeding. We generally have about 120 to 150 bulls from all over the state of California. There's the teaching side and I'm building my research program around bull management and development, which is very different than what I did for my PhD with Heifer development. It is run in a similar way, thinking about the influence of nutrition and it's link to fertility. But now I'm working on the male side, so again way out of my comfort zone. It's been a really cool experience to get students involved. Not only in just animal husbandry and management, but also on the research side of things as well. And then, of course, there's the outreach element engaging with not only the bull breeders that bring bulls down to Cal Poly, but also of course the bull buyers. We have a really great support system here on the Central Coast. That's kind of what my year looks like. I currently have three graduate students because I'm a glutton for punishment. Just kidding. I've been very fortunate to have really wonderful students, and that's what I really love about my position. We're not primarily focused on research, so I can tailor my research program to be a lot more focused to also engage undergraduate students more so than I probably would if I was at a land grant institution. That's just from my own personal experience. When I was a graduate student, we tried to get undergraduates engaged, but it was very minimal. Now it's really cool to be able to find a students that are freshmen or sophomores and have them for their entire undergraduate career. Some of them go to vet school. I've sent a lot of students all over the country for Master's programs. Seeing my students success far after they leave Cal Poly is the coolest thing about my job. Mentorship is what I really love about our job.

What is something you learned after starting your position that you weren't taught in grad school?

I transitioned directly from my PhD into a position which we're fortunate to be able to do in our field. I have a lot of friends that are also new faculty and I learned very early on not to be afraid to ask questions. Don't be afraid to ask for advice and don't be afraid to look stupid.

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CAREER CALL WITH ZACH MCFARLANE

I think we all struggle with confidence, especially when you first begin. You think, “Wow, I am not prepared for a lot of the administrative roles. I'm not prepared to manage people.” I've struggled with managing students. In a managerial capacity you don't really learn that and I was very fortunate to have great mentors both at Cal Poly as well as outside of Cal Poly that gave me advice. It's a lot a lot of long hours. During your first year, especially. What I would recommend to a lot of people is don't be afraid to ask for help. Don't be afraid to ask for guidance because it's only hurting you in the long run. And don't be afraid to look stupid or feel stupid at times. I hate that word. Why do we ever feel that asking a question would make you sound dumb or sound stupid? I try to get my students out of that mindset. Within the first day, during syllabus week, I say don't ever feel afraid to ask me a question, to ask for support, for guidance, no matter what level you are. Whether you're an undergrad, whether you're a new faculty member or whether you're a graduate student. It holds you back if you have that fear of looking dumb in front of other people. That's the mindset you really have to focus on in your first year, especially that transition from graduate student to professional. You have to be willing to seek advice and get out of this mindset of impostor syndrome. We talk a lot about that in academia and I think it's valuable to not know what you're doing and learn on the job. Everybody is going to hate me for this, but learn by doing, right? That's the Cal Poly motto. As cliche as it sounds, that's how I was able to keep going is by learning on the job and not being afraid to make mistakes. That is number one to me. What I try to train all of my students is to not be afraid to make mistakes. That's life. And yes, it can be frustrating. It can be a problem for in research, but we have to know that as mentors our students or our staff are going to make mistakes and we have to plan for that.

What is your favorite food?
As cliche as it sounds, you can never go wrong with a rib eye steak. I’m a huge fan of meat and potatoes in general.

What is the type of the song that usually plays in your radio?
I would say Texas country red dirt music. I've been listening to Cody Jinks a lot lately. I think there's a lot of really cool artists that kind of fly under the radar that are not necessarily mainstream country.

What is the coolest place that you have ever visited?
I love Scotland. One of my favorite cities in the world is Edinburgh, Scotland. I'm hoping to go back this summer for a visit. I'd like to take my wife.

What is something you would tell your younger self that you know now?
My joking answer is that your grade in chemistry is not going to determine the course of your career. The advice that I received very early on is to network as much as possible. A lot of people will get frustrated with me for saying this, but my old mentor, Travis Mulliniks, used to tell me not to let school get in the way of your education. What I mean by that is to be willing to do a lot of those extra-curricular activities. Be willing to get out of your comfort zone and meet new people and learn new things. Be in class, study hard, but also take every opportunity to get those experiences while you can.

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CAREER CALL WITH ZACH MCFARLANE

What is your CattleCal top tip?

There are so many that's part of my problem. I try to constantly learn so I love podcasts. I love Ted talks. I think there are so many great Ted talks out there and there are a lot of great podcasts both related to beef cattle production and mindset. I think there's a lot of anything related to changing our mindset, and I think that relates back to beef cattle production a lot, right? Especially in this state. Management has to be flexible, especially in a drought scenario. You have to think outside the box, and so constantly finding new material or new ways of thinking that might not even be related to beef cattle production. That was always my advice from my mentors. Go and read topics that may not necessarily relate to your research. It can give you a lot of experience and a different way of thinking. Moving forward, I think the way beef cattle production needs to go is really thinking about what out of the box solutions can we find that can improve beef cattle production in all different facets of production. A lot of people say that research paper from 1980 is outdated, but there's still a lot of value. A lot of the greatest research and setting the groundwork in the foundation for what we're doing is some of the work from the leading scientists from the 70's, 80's, etc. I think there's value in learning from the past.

How can our listeners follow your work?

- *Website*: https://animalscience.calpoly.edu/zach-mcfarlane-phd
- *Youtube*: Cal Poly Bull Test and Beef Program (https://www.youtube.com/channel/UC_JMJQlpqWtRh5Z8MzCuTDA)
- *Facebook*: Cal Poly Bull Test (https://www.facebook.com/cpbulltest/)

RESEARCH CALL WITH ZACH MCFARLANE

This week we speak again to Cal Poly San Luis Obispo professor, Dr. Zach McFarlane about his research regarding bull management.

In the last call we spoke about the Cal Poly bull test and sale that you put on each year. Could you tell us about that program and what started that idea?

Fortunately for me, the Cal Poly Bull Test has a really long history. We've had the Cal Poly Bull Test for 65 years. We are going into our 66th year here in 2022. We hold our annual bull sale the first Sunday of October every year. I was very fortunate to come into a program that was already strong. It also allowed me to think a little bit about how my training and my research and teaching program can fit this already very strong program. How can I put my own spin on it? How could I potentially make it better? The bull test started in 1956. It was one of the earliest performance bull tests in the country. It originated with a group of Hereford bulls. Now it has transitioned to an all breed performance test. The goal was to provide range ready bulls to some of our local producers not only in San Luis Obispo, but throughout the state of California. It transitioned into the only fully student run bull test in the country. Meaning that we have student managers that are responsible for caring for the bulls day in and day out as well as students that help me with all of the marketing side and all of the data collection side. Really it's just me and my coworker Aaron Lazanoff that run the beef unit and our group of students. We bring in about 150 bulls per year. This is a consignment sale. We bring in bulls from bull breeders across the state of California. We tend to have some producers from Nevada, as well. They bring their bulls to Cal Poly the last weekend of April/first week of May, generally. They remain on campus until our sale in October. We test their average daily gain. We are hoping we can continue to improve our program by implementing more feed efficiency opportunities with some new feeding units that help us monitor feed efficiency. That's my most recent goal with the bull test.

Can you talk about some of the research in the program you have been developing?

My training is really with heifer development and grazing programs. When I got to Cal Poly, part of my job was to be the advisor of the Cal Poly Bull Test Program. What a better opportunity to do research that's unique, not only to Cal Poly, but in general. Very few people work with bulls. That was a really exciting opportunity for me to start working with my undergraduate students. That was how I started. We used a lot of the historical data that was compiled here from the bull test program over the past couple decades. We have very strong data sets. That was a great opportunity for students to start learning about data collection and data processing and analysis. My approach has always been to think about development. What happens during development that can influence fertility, for example. Is that behavioral? From a nutritional standpoint as well as the growth and development of the reproductive organs. That's helped me develop my research approach to what's going on at bull test. Then, on top of that, what happens after those bulls leave? How do we track their performance? Is there really a way that we can pinpoint some of our successful breeders at bull test and how does that translate to their later performance in life?

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RESEARCH CALL WITH ZACH MCFARLANE

Part of my original thought was how do we establish if there is a research or education that we need to deliver at the Cal Poly Bull Test without understanding what management decisions or what selection factors that our California bull buyers are actually utilizing. After getting students involved in data mining, how do we even establish if there is a problem in bull development and/or management. I developed a survey to start.

What was the survey you developed?

I worked with Dr. Kasey DeAtley at Chico State as well as Tracey Schohr, a livestock advisor for UC ANR up in Northern California. At a California Cattlemen's meeting in Reno a few years back, we wondered how we could work together and what we could do since we are all in different locations and all interested in bull selection and management. Tracey has quite a bit of experience with producer surveys. We sat down and talked about developing a survey that encompasses not only selection factors like expected progeny differences, which breed selected, etc, but also what happens after you buy that bull. How do you manage the bull? What's the longevity of that bull? Why do you cull a bull? What drives those culling decisions? What we decided to do was develop a survey. We had about 30 questions. It was a mailed survey, so we developed it to look like a bull sale catalogue. We distributed it with the California Cattlemen's Association mailing list. We were very fortunate to have the support of CCA as well as the California Beef Cattle Improvement Association. We used that mailing list and we sent the survey in catalogue form. What happened was that producers would fill out the survey by hand, rip off the outside cover, and there was an prepaid envelope that they could stick the survey into and mail it here to Cal Poly. I had some undergraduate students help me compile all of the data for data analysis. We sent out about 1400 surveys and we received over 200 responses back. It resulted in about a 16% response rate, which we expected. Surveys, especially of that length, can be difficult to receive responses. We also sent out a follow-up survey, so we sent out two rounds just in case it was lost in the mail or for whatever reason it was thrown away. We wanted to bug producers a couple of times. The way that we maintained data integrity was by having a very specific code at the bottom of the survey that would not allow us to mail a survey response and duplicate those responses.

What did you learn from the survey?

Overwhelmingly, producers preferred to purchase angus bulls (over 80% of producers). The average bull battery was about 18 head, but we noticed that the standard deviation was high, which would imply that we were receiving responses from producers that were the largest producers in California as well as what we would consider an average producer in California with a smaller herd size. We did have some producers that had operations in multiple states in the western United States. The average bull purchase price was approximately $5,000. The average bull longevity was 5 years. It was interesting to get some of that initial data to explain why we select bulls. Overwhelmingly, birth weight and calving ease direct EPDs and anything related to birth weight were the primary selection EPDs that we saw from our bull buyers. We also asked some questions related to marketing.

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Over 89% of producers felt that a bull preview (prior to the sale they wanted to see the bull in person) was highly important. Bull body condition was very important (over 87% of producers said that they were in agreeance that it was an important attribute for them). We were also interested to see not only why they were selecting these bulls, but also what happened after? How did they manage bulls in the off season? There was quite a mixture of responses. A lot of our producers manage bulls in a bull pasture separate from the rest of the herd. Some producers would actually supplement hay in those bull pastures. Very few producers would manage bulls on a high energy diet in a dry lot system. More of a grazing system for our producers here in California. When you think about breeding soundness exams, we wanted to know how often producers performed one. When did they evaluate semen quality? What was somewhat surprising, 20% of California producers do not evaluate semen quality after purchasing a bull. That's problematic. Why are they not analyzing semen quality? Is it convenience? Is it because they don't really understand the value? We can't really tell for certain based on our data, but that gives us starting point. Can we educate producers about the value of a breeding soundness exam? Finally, one of the things I was very interested in was what the primary culling criteria was for producers. Bull age, structural soundness, and injury were the primary culling criteria. Fertility did not seem to be as much of a culling criteria, but it was also listed in the responses. Overall, that gave us a starting point to ask what is some research we can conduct related to some of the things we learned through the survey. I've published a few popular press articles with the California Cattlemen's Association, presentations with various organizations across the US, and recently my graduate student, Megan Banwarth published a proceedings paper for the Western Section for the American Society of Animal Science based on the data in the survey. That's part of her Master's thesis program.

Were you able to see any trends on the age the operators culled their bulls? Are they able to keep the animals longer based on management system?

That's an interesting point. That was one of the goals of the survey. I ran a few simple correlations between the responses looking at average bull age and even price and things like that. There wasn't any trend that I could see. We're still working through the data analysis, particularly for those type of questions. Based on some of the things that we learned, that would be ideal to pinpoint a specific issue (culling decisions, post-sale management, etc.) as a follow-up survey and potentially doing some interviews. Have it be more qualitative than quantitative. That's way out of my pay grade, to be honest. Qualitative data really scares me. Through this process I've learned a lot and started to build a great team here at Cal Poly as well as some collaborators across the country. We worked with New Mexico State University and they conducted a version of the survey we did here in California using the same questions. There were a few minor changes based on regionality. Overall, it was very interesting to collaborate and we're hoping to submit companion papers in the future with some of the New Mexico producer data as well as the California producer data. The way we tried to design the survey was so that we could have some follow up surveys based on what we collected and analyze. Also, this survey could hopefully be used in any location, any region of the country, and it would still be fairly consistent. Of course, there would be some regional changes, but the idea was that through the development of the survey we could collaborate and open this up to a broader audience.

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What's next for you and your research program?

The reason I wanted to talk about the survey was because it helped launch a lot of the research that I was hoping to do and it helped me fine tune some of my research. One of the things that I'm very interested in is development, this concept of growth and development. My background with heifer development led naturally into bull development and management, both during that period of weaning and as they approach maturity. One of the things I have started to do is follow our bull battery here during the breeding season. We know that bulls lose body weight. I'm interested in the concept of body weight fluctuation. We know that body weight fluctuation can have a negative impact on fertility in females. It is well documented in various production systems. How does that influence the sire? The sire provides half of the genetic potential for the calf crop. There's all of these interesting ways we can go epigenetically, but that's more me dreaming long term. Right now my focus is getting these bulls off of the bull test, having young bulls managed with mature bulls, and seeing how the interactions between those bull impact fertility and more importantly, what happens after calving season. I put GPS collars on every bull here at Cal Poly during the breeding season. We have a 65 day breeding season. We artificially inseminate every female, excluding our 2 year olds. My thought was could I identify bulls based on their activity, behavioral attributes, genetic component to behavior and activity that would result in a more proficient breeder. We've been collecting data for the past 3 years. We DNA test every calf that's born on campus. We're able to actually see our bulls' workload year after year. We're moving into our third year of data collection. Along with the GPS data and parenatage, I am also looking at bull body weight loss. On average our bulls lose about 200 lbs during the breeding season. We're taking a semen sample at the beginning of the breeding season, the end of the breeding season, and we are hoping to do a follow up semen sample about 60 days after the breeding season for the spermatogenesis cycle. We're also looking at carcass ultrasounds, so how does losing body weight impact the amount of fat over the ribs and how does that impact any intramuscular fat deposition. On top of that, does the change in activity, body composition, and body weight relate to fertility or ultimately parentage? Are those that are working the hardest losing the most weight? Are they the most active? Where are they spending their time? Are those breeders that are more prolific going and finding females? Are they hanging out by the water trough? For whatever reason, are those cows coming to them? How do we really know? Obviously, this needs to be a long term process and it can't really just be at Cal Poly. I've been working at building relationships with producers in the local area and throughout California. I've had conversations with some potential collaborators at Chico State and at UC Davis. We're hoping to expand this research on this concept of libido. At the end of the day, that's really what we're trying to get after. Is there a way to identify libido even earlier than the breeding season? We know that for whatever reason, some bulls are just lazy or maybe they have aggression and the bulls that are less aggressive are not breeding. Can we pinpoint any characteristics related to libido at the Cal Poly Bull Test? Can we identify potential breeders very early on? We know there's a physiological impact just based on some previous literature, but a lot of it is behavioral. At the Cal Poly Bull test, can we think about it in the ways of aggression behaviors. Maybe at the feed bunk, maybe they're mounting more frequently. From there, I've built some side projects related to metabolism. Is there a chute-side test that we can develop?

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I'm taking semen samples and blood samples from bulls during the breeding season. How do metabolites change in seminal fluid, for example. Our preliminary data suggests that there aren't any issues with fertility that we can detect in a breeding soundness exam, but maybe that bull body weight loss is impactful for those sperm cells. Moving from an applied type of position and incorporating some of the molecular approaches is the next step for me. I'm so passionate about my research right now because I have such a cool team. I have three graduate students. Cal Poly is famous for learn by doing and that's why I love my research program. I have a group of about five undergraduate students and the master's students that help me collect data. It's just a great student learning experience. That's just a highlight of some of the things that we're doing.

How can people access your work?

California Cattleman Articles

- Results are in: California Rancher's selection and management of herd bulls survey complete (July/ August 2020). https://issuu.com/calcattleman/docs/cca.ja.2020_online/84
- Bull management for a successful breeding season (April 2021). https://issuu.com/calcattleman/docs/ca_april_2021_online/14

Western Section American Society of Animal Science paper:

Banwarth, M. R. , C. K. Stevenson, C. E. Field, J. P. Dubowsky, K. L. DeAtley, T. K. Schohr, and Z. D. McFarlane. 2021. Survey of beef bull selection and management practices of California producers. Translational Animal Science. 5 (Supplement_S1): S154–S158. https://doi.org/10.1093/tas/txab153.

FEEDLOT RESEARCH BRIEF

Effect of fat level and source on finish diet feeding value and feedlot cattle performance

Introduction

- Restraints on fat supplementation in feedlot diets can affect cattle performance
  - Too high or low levels in the diet has been noted to impact performance
  - Increased cost of fat can make supplementation difficult
- Yellow grease (YG) is any combination of waste grease from bakeries, restaurants, schools, etc, and/or rendered animal fat.
- Blended animal-vegetable fat (BVF) is a mixture of rendered animal fat or grease, restaurant grease, hydrolyzed animal fat or vegetable oil, and acidulated vegetable or animal soap stocks.
- This study aimed to evaluate the impact of level of supplementation of YG and BVF on feedlot cattle growth rate and net energy value of the diet.

Methods

- 228 crossbred steers (~733 lbs) were blocked by weight for a 125 day feeding trial.
- Treatments:
  1. Basal diet with no supplemental fat
  2. Basal diet + 4% yellow grease
  3. Basal diet + 4% blended animal-vegetable fat
  4. Basal diet + 8% yellow grease
  5. Basal diet + 8% blended animal-vegetable fat
  6. Basal diet + 6% blended animal-vegetable fat + 2% crude corn-soy lecithin
- Basal diet was steam-rolled, barley-based

Results

- Fat supplementation:
  - Increased empty body weight, which was reflected by increased empty body protein, fat, and energy.
  - Increased net energy of the diet.
  - Did not affect feed intake.
  - Decreased feed required per unit of empty body weight.
  - Increased empty body fat, KPH fat, and marbling score.
- Increasing fat supplementation from 4-8% did not affect feeding value of supplemental fat.
- Net energy values of the two different supplemental fats were not different.

TABLE 1. COMPOSITION OF EXPERIMENTAL DIETS FED TO STEERS

Item	Treatment 1	2	3	4	5	6
Ingredient composition, % of total, DM basis						
Alfalfa hay	8.00	8.00	8.00	8.00	8.00	8.00
Sudangrass hay	4.00	4.00	4.00	4.00	4.00	4.00
Steam-rolled barley	58.90	58.90	58.90	58.90	58.90	58.90
Steam-flaked corn	18.00	11.45	11.45	4.90	4.90	4.90
Cottonseed meal	.90	3.45	3.45	6.00	6.00	6.00
Yellow grease		4.00		8.00		
Blended fat[a]			4.00		8.00	6.00
Crude lecithin						2.00
Cane molasses	8.00	8.00	8.00	8.00	8.00	8.00
Urea	.30	.30	.30	.30	.30	.30
Trace mineral salt[b]	.50	.50	.50	.50	.50	.50
Dicalcium phosphate	.10	.10	.10	.10	.10	.10
Limestone	1.30	1.30	1.30	1.30	1.30	1.30
Vitamin A[c]	+	+	+	+	+	+
Chemical composition						
DM, %	89.30	90.25	90.01	90.39	90.01	90.24
ADF, % of DM	8.94	9.23	9.31	9.88	9.93	9.70
CP, % of DM	13.38	13.69	13.81	14.94	14.31	14.69
Ether extract, % of DM	2.04	5.55	5.56	9.23	8.82	8.65
Calcium, % of DM	.92	.98	.92	.94	.89	.83
Phosphorus, % of DM	.33	.34	.35	.36	.37	.36

Implications

Fat supplementation increased body weight and net energy value of the diet. There was no difference in net energy values between the two fat supplements.

CONTACT

Have any questions, comments, or suggestions? Want to send in a Quiz Zinn question? Contact the creators through the below email or through their social media profiles.

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