

VOL. 2 ISSUE 9 · OCTOBER 2022

CATTLECAL NEWSLETTER



ANNOUNCEMENTS

Welcome to the CattleCal newsletter for October 2022! In this issue we have exciting information on research and activities completed this month, the career and research of Zachary Carlson, Assistant Professor and Beef Extension Specialist at North Dakota State University, and a look at a research paper on global beef x dairy crossbred considerations. 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.



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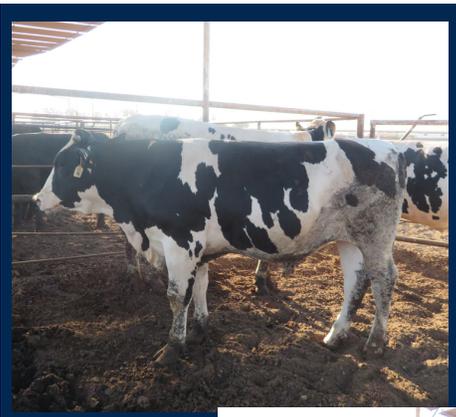
THIS MONTH IN RESEARCH

In September we continued our two projects. We saw the lowest ADG of the year and very poor feed efficiency in September. In September, average temperature was 87.5° F (5° F less than August), average maximum temperature was 100° F (5° F less than August), and average minimum temperature was 75.2° F (6° F less than August). In September we experienced fairly heavy rains over a short period of time, affecting pen mud accumulation

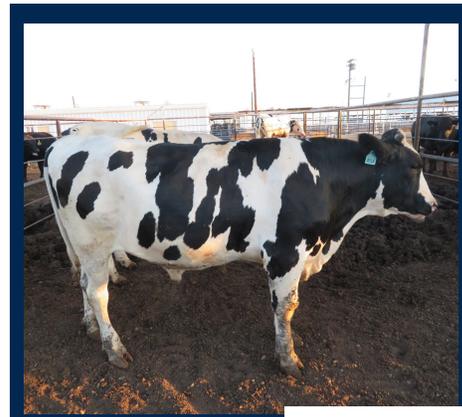
DAYS 224-252 PERFORMANCE SUMMARY

	Holstein	Crossbred
Body weight (d 224)	1077 lbs	1082 lbs
Body weight (d 252)	1128 lbs	1128 lbs
ADG	1.84 lbs/d	1.66 lbs/d
DMI	18.5 lbs/d	17.7 lbs/d
F:G	10.1	10.7

August 2022



September 2022





CATTLECAL PODCAST OCTOBER EPISODES

Career Call - CCP#072

This week Brooke Latack and Pedro Carvalho called Dr. Zachary Carlson, beef extension specialist at North Dakota State University, about his journey from growing up on Minnesota dairy to leading research and mentoring students in North Dakota.

Research Call - CCP#073

This week Brooke Latack and Pedro Carvalho speak to Dr. Zachary Carlson again to discuss his research related to protected lysine supplementation in diets with and without distillers grains.

Feedlot Research Call - CCP#074

In this episode, join Pedro Carvalho and Brooke Latack as they discuss a review paper looking at global considerations for beef x dairy crossbred calves.

Quiz Zinn - CCP#075

In this episode, we asked Dr. Richard Zinn about supplementation of vitamin A in feedlot diets.

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.

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- Instagram: [@cattlecal](https://www.instagram.com/cattlecal)



QUIZ ZINN



Could you talk to us about considerations to take when supplementing with vitamin A for a feedlot diet?

Background

That's a very interesting topic. I need to give a little bit of background first. To begin with, we should understand that vitamin A is very essential and that deficiencies can occur in feedlot cattle. The kind of deficiency symptoms that we would observe in feedlot cattle have to do with two very important functions of vitamin. Vitamin A along with vitamin E serve as antioxidants. When we have conditions of oxidative stress, like a newly received cattle, then it's going to play a role. Vitamin A is also very important in terms of epithelial and mucosal integrity. People talk about night blindness and stuff like that, but what you would see in the feedlot has more to do with those two factors, specifically mucosal integrity. A very obvious symptom of vitamin A deficiency would be ocular clouding and a greatly increased susceptibility to pink eye. These are the things that would be most obvious in the feedlot if you had vitamin A deficiency.

Liver Storage of Vitamin A

The problem with this is that in a feedlot, cattle are coming from all different kinds of backgrounds. You can't just assume that the cattle have some kind of vitamin A store. Vitamin A is going to be stored in the liver. There can be very high levels of vitamin A storage in the liver that would endure without any supplemental vitamin A for maybe 150-180 days. In some conditions, cattle would come in and you would do a study and say there's no need for vitamin A at all in the diet. In other cases, the cattle can be very depleted, for example if they're grazing corn stubble where there's already a problem and they are going to be depleted when they come into the feedlot. A lot of interest is in the condition of the vitamin A status of the animal coming into the feedlot.

What I am going to say is dogma, but basic research might indicate that you need about 25 micrograms per deciliter in the blood of vitamin A. The animal is going to draw from the liver to try to maintain blood vitamin status at a constant or it will slightly increase. You will see that animals that are in good status will have about 25 micrograms or greater of serum vitamin A.

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QUIZ ZINN



When the animal begins to be depleted, in other words as liver stores start dropping dramatically, then the animal doesn't retain that store. Then you see the plasma levels begin to drop. When plasma levels in incoming cattle fall below 25, then we can assume that the liver stores are rather depleted. What constitutes depleted liver? Well, the work that we and others did suggests 2-4 microgram per gram.

The problem is that we can't assume that all the cattle coming in have good vitamin A storage and so we have to consider supplementation in the diet. Historically, vitamin A has been very inexpensive, so nutritionists have been very liberal with vitamin A supplementation. Even though the NRC recommends 2200 international units per kilogram of diet dry matter (a generalized recommendation), nutritionists, on average, feed a lot more than that. There's a lot of dogma out there. Some people believe that even high levels of supplemental vitamin A reduce the incidence of calculi. In the wintertime, you may see some nutritionists really pushed that level of vitamin A up in the diet. This is less common today because of the very great increase in cost of vitamin A.

Recommendations for Supplementation

The research with vitamin A has been highly variable. Even where they've tried to titrate it down, the animal's ability to store vitamin A makes it very difficult. Generally speaking, when you put vitamin A in the diet, supplementation of less than 1500 international units per kilogram is when we're getting down to potentially a risky situation in the feedlot. The liberal recommendation by the NRC of 2200 is very liberal and unlikely that any animal in the feedlot would actually require that high of a level of vitamin A.

Supply in the Diet

Like many things in terms of nutrition, the big problem in terms of assessing requirements is to know what the supply is. That's the problem. Something that I think a lot of nutritious maybe have forgotten or maybe they never knew was that vitamin A is very labile. It's labile before it's put in the diet, meaning its stability is affected by things like mineral content of the diet. A lot of the time we add it in the supplement where there's a high mineral content.

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QUIZ ZINN



It's affected by moisture content of the diet. It's affected by sunlight. Vitamin A is affected by a lot of things. We can't assume when we put that in the diet that it is actually what the animal is going to get when the animal eats the diet. That may be a reason for maybe being a little more liberal on vitamin A supplementation.

Rumen and Small Intestine Degradation and Absorption

We sometimes forget that vitamin A does not survive the rumen very well. Degradation of supplemental vitamin A in the rumen is probably at least 70%. Only about 30% of the vitamin A that you give survives the rumen. That would be on average. There are two good studies that show that. When it gets into the small intestine, the amount that's absorbed can be variable. There's research that suggests as high as 90%, but it may be as low as only about 15-20%, of supplemented vitamin A is actually absorbed. There are a number of factors that influence vitamin absorption from the from the intestine. What I'm saying is that we're giving a requirement or an allowance when we don't know exactly what the supply is. That is a very dangerous situation to be in when you're a nutritionist trying to make sure that you've covered the bases. This has led to a practical range of supplementation of 2000-4000 international units per kilogram of diet dry matter even though the average is much higher than that. I would say that practical supplementation levels would be somewhere in that range, and I would suggest even lower levels maybe around 2000 international units per kilogram would be adequate. What some of the major companies do that sell vitamin A for feedlot use is the vitamin A is protected. It has a kind of a gel coating that helps for dispersion. Typical vitamin A supplement might be 30,000 international units per gram of material. You can see that we're not adding a lot of this material to the diets. We need to be sure we are getting good dispersion of that material in the diet itself, which is another consideration.

Injecting Vitamin A

Because vitamin A is important and because we want to make sure that the animals get the vitamin A that we would like them to get, the alternative to putting it in the feed is to inject subcutaneously, which is what we do. Every time we work the cattle (every 112 days), we give them a shot of 500,000 international units. Where do I come up with 500,000 international units?

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QUIZ ZINN



Assuming that 70% is degraded, assuming that digestion in the small intestine is 90% absorption. Then calculating for the same amount of supplementation as feeding vitamin A at 2200 international units per kilogram with eight kilograms average dry matter intake for 112 days. This would be about 500 international units per day of active, absorbed vitamin A for the animal. That's the basis for that. This level is for calves. If we were looking at bigger cattle, then we would want to go to a million units each time we worked at cattle to be sure that they're getting adequate vitamin A.

Marbling

The last thing I want to say, and this is very controversial, is that a number of studies have been conducted that showed that when animals are slightly deficient in vitamin A they have greater marbling. Not so much the choice range. What is really affected is the prime range. Nowadays because of how the grid works, reducing the amount of prime can be very costly to a producer. A lot of studies indicate it can reduce the amount of prime by half. In other words, if typical prime is 10% then with excess vitamin A it can be 5%. It can be a big drop in the number of prime. That's another thing in favor of being careful to not overfeed vitamin A. Like I said, that's controversial. Personally (this is me talking), I believe it. I believe that excess vitamin A will reduce marbling, specifically the prime rate.

Holsteins

Because we're down in the southwest, we're mostly talking about Holsteins. I want to give a warning that Holsteins coming into the feedlot are going to be deficient coming into the feedlot. The studies we've done, we've actually measured plasma of incoming Holsteins. Their liver stores are not adequate. You're going to see plasma vitamin A levels that are lower like 15 micrograms per deciliter or something in that range. You want to be very careful to make sure that they're getting vitamin A either by injecting it, which is what I would recommend, or by feeding it at adequate levels so that we've covered their requirements.

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QUIZ ZINN



Beyond changes in marbling are there any other issues that can happen because of over-supplementation of vitamin A?

You can feed up to fairly high levels of vitamin A without having detrimental effects on performance. One of the things you'll notice early on is that when you have a vitamin A deficiency in the early receiving period, feeding vitamin A or providing adequate amounts of vitamin A will increase our average daily gain. That's really relatively consistent. You have to have a deficiency before supplementation will increase average daily gain. This is especially critical during the early period and some major feedlots that I work with inject vitamin A and feed vitamin A. When cattle come into the feedlot they will give them half a million units of vitamin A and also then provide vitamin A in the feed just to make sure that they get that covered during that early receiving period. They've done studies where they've actually tried to look at how long you can have a deficiency in order to see the marbling effect. It's a little bit controversial, but my personal opinion is that the decrease in marbling is seen when vitamin A is fed towards the end of finishing. That's one of the things that's really nice about giving an injection 120 days before harvest or thereabouts. Then they are going to be low on vitamin A close to finishing. As you know, our cattle tend to grade high on the prime side. This may be part of the explanation. I had a nutritionist many years ago that that criticized me about this because he thought that was one of the reasons why we had so much prime. These things that I'm saying right now is Richard talking. We don't have a lot of sound science. For those who might be students listening to me, an area of investigation that might be interesting would be to look at the time of the feed is made until the animals eat it and determine how much vitamin A you discover back in the feed. There are zero studies looking at this stability issue there. We talk about it, but there's absolutely zero research on it. It is something that I think is lacking in literature.



CAREER CALL WITH ZACHARY CARLSON



We speak to Dr. Zachary Carlson, beef extension specialist at North Dakota State University, about his journey from growing up in Minnesota to leading research and mentoring students in North Dakota.

Where are you from and what do you do?

I'm originally from Minnesota, just north of the twin cities (Saint Paul/Minneapolis). I'm not too far from there now in Fargo, ND. I am an assistant professor in the Department of Animal Sciences here at North Dakota State University. A majority of my job is extension beef cattle specialist, so working in all things beef cattle related.

Why did you decide to go into agriculture, specifically cattle?

I did grow up on a farm. The part of the world I grew up in was old potato and dairy country. We were on the dairy side of that, not so much the potatoes. We had about 100-120 Holsteins. Pretty common small family farm for that time period growing up. We got out of that business. Dad sold everything right around the early 2000's. I was still fairly young. I transitioned then into more of the classical 4H scene showing livestock. Trying to show us many species as possible. In doing that, I had met and was doing chores for a neighbor. He and his family are really big into the show scene, showing Charolais and Red Angus. I got connected with them in that way. It just so happened that he was a PhD in ruminant nutrition and was working for a company. In high school you're trying to figure out what you're going to do with the rest of your life or even what you're going to do next week. I clung to that and saw that he really enjoyed that, or he looks like he loves his job. That naturally then made me look at animal science programs in the Upper Midwest. I looked at Minnesota's program, of course, South Dakota State, and North Dakota State and ended up landing at North Dakota State University. Early on I had thought I wanted to go to grad school. I was touring schools in 2009/2010 and they were just putting the final touches on their new, at that time, beef cattle research complex that had their individual feeding system. Long story short, I figured that if they're building a state-of-the-art research facility, they must do state-of-the-art research. I wanted to learn more about that. That was a big draw for me. I ended up coming up here to Fargo and did that four-year classical program. I got very involved in undergrad research as I had hoped to and that kind of sealed it for me.

When you went to North Dakota State University, did you plan on eventually going to grad school?

Yes. I get the great pleasure of working with a lot of the same faculty now that saw me 10-12 years ago as just a kid not knowing exactly what was going on in the world. When I got there, I sat down in my undergraduate advisor's office and she asked that age-old question of what I was going to do when I grew up. What I was going to do after this. I had said that I want to get my PhD and I wanted to be a consultant nutritionist. I asked how I can best prepare to do that.

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CAREER CALL WITH ZACHARY CARLSON



Did you ever think you wanted to be a veterinarian, or did you always know that graduate school was for you?

No. The classic observation is a lot of students start getting their feet wet with animal sciences thinking the vet route. I took as much of the pre-vet classes as I could knowing I wasn't ever going to go to vet school. I just wanted more of a science focus.

How did you get started in working in research so early during your undergraduate studies?

I came in the fall of 2010 to NDSU, and that facility was just putting the final touches on it. The first round of animals came in the spring of 2011. I wanted to go knocking on doors. My advisor, Dr. Kasey Maddock Carlin (meat scientist at NDSU), told me the people I needed to go talk to and start having that conversation with them. I did that and I ended up starting as a student employee at that facility right away. I saw what research was. Got to help a little bit as a student employee can to help work animals and things along those lines. In my sophomore year, maybe junior year, I got to have an undergrad project. I kept asking those questions to those P.I.s and advisors that were doing research and when the time was right, they gave me the opportunity to do a little more work there. I got to present research at the Midwest Animal Science meetings as a junior. That got that ball rolling as I had thought that's what I wanted to do and was reassured through the experiences I had there.

How was your transition from undergrad to grad school? How did you decide to go where you did?

It was like how my adviser, Casey, was helping me find undergrad research here. It was pretty much a similar system for grad school. She gave me 5-6 names that she knew of out there. Luckily there's a strong ruminant nutrition team up here: Dr. Marc Bauer, Dr. Kendall Swanson, Dr. Joel Caton. I went to all of them. NDSU was a strong candidate or position for grad school, staying here and kind of building on what I had already developed. I had twelve other faculty across the US and I reached out to them. You start funneling in who has funding. Who's got a position possibly. You start having those phone calls and e-mail exchanges. I whittled it down to four schools: NDSU, University of Nebraska, Kansas State, and Oklahoma State. I went and interviewed at all three schools, toured all three schools. It was a really tough decision. I ultimately chose Nebraska. I don't know if it's still true, but a lot of people were telling me that every degree of your undergrad and graduate programs should maybe come from a different university, or at least you should try to gain as many experiences as possible. I think that's still true to many degrees, but I think it depends on your relationship and things like that. I knew if I stayed at NDSU it would have been a really good, but I needed to experience something else because I had already had a few years of just undergrad research. I had exposure and I wanted to see something else. I ended up landing with one of my undergraduate advisor's college colleagues. Jim McDonald is who ended up being advised by and they had both graduated from NDSU together. She knew him quite well. I was able to go down there. Jim is a North Dakota native, so his brother actually still ranches out west here.

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CAREER CALL WITH ZACHARY CARLSON



You stayed at the University of Nebraska for your master's and PhD program, right?

Exactly. That's where maybe I'm biased in that thinking sense. I got my feet wet. Initially I thought I wanted to be a consulting nutritionist or something within the industry in that regard. I started off being co-advised by Jim and Galen Erickson down there. I was feedlot focused. I maybe took a week off from graduating undergrad to getting down there. Two weeks later, I had started the first study. Obviously with a tremendous amount of help. I didn't really do much of it at all myself, but I was already in the mix. This whole time I've been building up in undergrad and going to grad school. I really enjoy this. I got down there and I was really enjoying it, but it was making such a pivot from undergrad to this very heavy science focus. The jargon, the language, it's all different. In that first year I decided that maybe I'll just get my master's right now and then I'll just go out to the industry and I'll start there. It had nothing to do with the school, it was just how I was perceiving all these things. All it took was about that year for me to get through that initial phase. Then I really started to get a little bit more comfortable. Things started clicking. Classes were making sense of what the research was. It made it easier. Halfway through my master's or so, I decided I'm definitely going to pursue a PhD somewhere and do something like that.

Was it because of your relationship with your advisors and your enjoyment of the work that made it so you stayed in Nebraska for your PhD?

Yes. They had given me a couple opportunities in my master's outside of my research. Some technician type responsibilities. I started to acquire a little bit more responsibility within their system. That ended up taking me an additional year to finish my Master's. At the end of my master's, I'm three years in now. I just graduated and at the end of that master's program, I was starting to consider where to go. I had talks with NDSU about coming back and doing some work up there. Ultimately, UNL had offered me a research coordinator position and that would encapsulate my PhD as well as learning a lot more about how research projects are managed, how they're designed, and so on. I was still thinking in my head that I wanted to be a consultant and had seen a lot of consultants that are doing quite well in the industry that held this position. The ones from Nebraska anyway. This obviously helped through their program and beyond to be successful. I took that position and stayed at Nebraska. I did pivot a bit. I was feedlot focused during my master's. I did work with Jim Galen and Matt Luebbe. Ultimately I transitioned from co-advised with Galen to co-advised by Matt Luebbe at the Scotts Bluff Research Center. I pivoted to more systems work. There's a big project that Jim got, and I got to be a part of looking at partial confinement cow calf systems. And then did some grazing work. I tried to pivot out and expose myself to some other research while staying at the same institution.

Why did you decide to go into academia instead of consulting like you had initially planned?

One thing I was very appreciative of in Nebraska is they bring a lot of alumni back in to talk with the students. Alumni from the graduate program. A lot of those in the past have been feedlot consultants, independent or maybe working with a company. I felt like I was getting a really good understanding of what those jobs are like in those positions knowing that there's this other piece within this other area that we could go into, which is academia.

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CAREER CALL WITH ZACHARY CARLSON



I started to pivot away from the consulting thoughts when I took that research coordinator position. Nebraska has a fairly large graduate group within ruminant nutrition. You're in between the P.I.s and the students in terms of helping facilitate research as well as helping the student's transition, whether they're incoming or outgoing. The mentoring capacity of that job, that I had no idea would even be a thing or an opportunity for me to help students with, really started to change my mind about it. It was essentially, in a way, like having graduate students. Not to say it was the same thing. It wasn't the case at all. The thing I looked forward to the most was helping students click. Whatever that was. Why we're doing something the way we're doing it. To see them fully understand it. To see them start a project, very green with lots to learn still, and then when they finish it present it somewhere. To see that that transition. It's really cool. That got me more grounded in the research of things. I really started to develop a strong desire for understanding research, doing research, and everything like that. I had that whole time, but two years into my PhD I needed to start making a conscious decision about where I was going end up. What my first jobs were going to be.

With that coordinator position, I ended up doing an extended PhD. I did an extended Master's and an extended PhD. Seven years of graduate school. I was seeing people that I graduated undergrad with that were out getting jobs. It was a little bit hard at first, but Terry Klopfenstein talked with me and said there's no rush. You never know what opportunity is going to come out and might look like. You might feel like you need to get in and get out. I think that's a big issue students have. They shouldn't have that thought. It's really about what you're learning and experiencing in your program. Year two of a four-year PhD is when I really latched onto that mentoring role that I got to have. I really started engaging in doing research and finding it very interesting. I got to be that person that saw the concept come from the advisor and got to actually make it physically happen with lots and lots and lots of help. Not just me. I got to actually follow through and see something that I felt I had a little bit of ownership over. That takes me into my last year of my PhD to get to answer your question. Dr. Mary Drewnoski was a huge influence on me. Her position at Nebraska is the same as mine. It's 30% research, 70% extension. I might have that little off. She started right after I did in my masters, so she just became new faculty at Nebraska and I had just arrived. I got to see her basically in that first six years of her career and make the transition she did. I really admire the way she did things. She's a big mentor of mine. That's initially where I latched on. I really appreciate the way she did things. She got the to interact with folks out there and the farmers and ranchers that are actually following through with research that we're doing. Taking concepts and things like that. It was a way for me to maintain a little bit of what I thought was that industry scope actually interacting with producers through the academic lense.

It seems like your mentors and mentoring others has been important through your career. How did you seek out mentors?

I don't know if I ever really consciously pursued looking for mentors. Looking back, I see that all these people were playing a mentor role. I don't think I had identified many of those until after the fact. I realized in graduate school a lot of people were recommending I find mentors. We have to find the people that we respect and somebody doing something we want to do.

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CAREER CALL WITH ZACHARY CARLSON



Find them and learn that. I didn't value that or even identify to try to find those people until probably late in graduate school. All of us are always doing it subconsciously or choosing. You're trying to find the best school that piques your interests in whatever ways that is, and that's going to train you to the abilities in what you want to do. And by doing that, you end up selecting those people that play large roles in your life and in your career. I wanted to find what I perceived to be the best place to go to do the best research. The push to try to learn the most from the place I perceived to be the best by creating that list as an undergrad with my advisor and reaching out to those people. I've never considered myself a great communicator. Graduate school kind of forces you into that position in a good way, but I wasn't really ever in undergrad. Even in my master's. That pursuit to want to find the best place. It's just all perception as to what is best. Once you find somebody, it's really about what do I want to do leaving school and who has experience that can best tie into that. If you're considering a master's degree and then you're going to end up going into maybe sales, that might be hard to find right in terms of school to find that mentors that positions right within a sales mentality. I think most people would agree, by the end of all the schooling, I realized it really never mattered what the class topic was. It's who's teaching it. I would take a class that has no end focus on agriculture or anything like that if I knew it was a well-structured course and that person was willing to dedicate time. That's really what it is, is somebody that values what they're doing in that position. Thinking about a mentor, somebody that values everyone within their environment and their group and appreciates that and fosters that. They don't even have to have the same focus or the same area of interest as you. It's really about knowing somebody that can share their experiences, share their knowledge. That's the only way I got to where I am.

How did you find the position you are currently in?

I had mentioned about timing and being in a rush, because I saw some students do that in their program and I had a story for that. Two years into my PhD I was making that transition to more academic focus. Mary Drewnoski helping me understand what extension is. This job that I'm in currently opened up when I was two years from graduating. I could not apply. I wouldn't be a quality applicant at that time for obvious reasons. I couldn't graduate in time. I really got bummed out because I wanted to move home. I thought in grad school that I was going to just keep moving away from home. Nebraska was the one step and then I don't know where next was, but it was going to be farther from Minnesota. I love my family and everything. I just wanted to get out and experience more and more. I perceived that as geographically. I got married in my master's and had some kids in my PhD. My wife and I started building a family. That changed everything for me. Now I was looking back. How can I go from Nebraska to closer to home? That job that opened up. I'm two years out from graduating. I was really bummed out. I kicked myself because if I would have just done a 2-year degree in my masters and a three-year PhD I would have been able to apply for that job. I'm not even sure if I would have done that. I wouldn't have the same perspective or maybe even changed into the academic setting. For all students looking at what's next and feeling rushed, when you're in school, you're always building to the next thing. When you can't see that thing, it's very intimidating. At least it was for me. Not knowing what's going to be out there.

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CAREER CALL WITH ZACHARY CARLSON



I think a lot of PhDs find themselves in that situation where it's all about timing. The person in my position prior to me just didn't work out and so they ended up reopening it. The timing had worked out great. It gave me that position that I knew I could mentor graduate students as well.

Can you tell us about what you do in your position?

Every extension system is different. In North Dakota, we have a county system. We have 53 counties and have 52 county agents that are agriculture agents. This position in the extension side is very focused on serving our stakeholders, which every extension has that objective across all universities. For those stakeholders I think we instantly gravitate towards the cattle producers at least as it relates to my job. There are also organizations within the state whether that be cattle focused associations and organizations as well as then serving our federal facilities like the farm service agencies, FSA, USDA, etc. Ultimately, my position is called a specialist because I'm supposed to help the agents within each county serve their beef producers. Our county agents can come from a wide variety of backgrounds. So oftentimes it isn't from a cattle focus. We have some, but when you have 52 different agents, you've got lots and lots and lots of different backgrounds. I've now started to figure out, at least it took me, I'd say up to this point in time, to really realize it's the same as how I perceive graduate students as these agents. They are coming from all different experiences. It's really about providing them content. Whether that be through extension publications or media things along those lines to help them stay current with what might be going on with their producers in their counties and helping them. That's a lot of what my extension down. One of the things I enjoy the most is I get to interact directly with the producers whether that be somebody that calls my office, emails me, or we run into each other when I'm at an event.

Is there anything in your position that you had to learn as you went and weren't taught in grad school?

Definitely a lot. I would say I had to seek out and figure more out about what extension is. I didn't have any real exposure to it. Galen has an extension appointment, and of course Mary does, as well. I had to figure out what it actually meant. What I knew of extension was coming from Nebraska and their system. Getting up here I had to rewire my thinking on what extension is up here. It took me a long time to realize the system differences. On paper you can see the system differences and it makes sense, but then you have to figure out who the people are within those positions and how they interact. From what was on paper and in terms of the extension system to how it actually is functioning and operating, we're just different. I had really no experience in graduate school in extension program planning or needs assessments. I read about those things but never facilitated any of those or had any involvement in that. And there's a lot that goes into extension. Some places offer those experiences and I encourage people to take those in. It goes back to your mentor. Finding somebody within extension that can highlight those for you to better understand what it means to serve extension.

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CAREER CALL WITH ZACHARY CARLSON



What is your favorite food?

I don't want to be cliché, but I really enjoy a rib eye steak cooked on the grill. But, again, it's kind of cliché, right? That's a lot of our background in that sense. I really enjoy just a steak meal with potatoes and a vegetable of some kind. I do have to plug my wife, Molly. She has a really good hamburger soup. I do not like soups very much and it's really good. So, it's up there as well.

What do you like to listen to?

I end up finding I don't read for pleasure as much as I think other people do. So, I try to fill my information while I have what I consider dead time (driving, etc.). A lot of talk radio, news radio is what I listen to. Music-wise I enjoy classic rock. What my dad always had on the radio. So, 60's/70's rock.

What is something you know now that you would want to go back and tell your younger self?

The biggest thing is time management. I'd tell myself to establish earlier on time management. Balancing time. You're forced to do that when you have a family. You can't ignore your family and you can't ignore your job or whatever you're doing. Before you're forced to do anything, it's always best to get a handle on it before that. I would go back and say to dedicate your time more consciously towards whatever you're trying to accomplish at that time and be structured about it.

What is your CattleCal top tip?

It was one that I was given a long, long time ago in the feedlot bootcamp and it was to read "The Fire of Life" by Max Kleiber. I still have yet to read the entire book. I get through chapters at a time and then life. It might shock you if you look it up. You can find it used. I found it used from a library and was able to get it that way. It's fairly expensive and there must not be a lot of copies. The book works through as if it's a class, so each chapter is focused. There are analogies, there are problems and there are answers in the back of the book like classic textbook. The book reads almost like a lecture series, but from a long time ago. Anyone that's interested in ruminant nutrition, I highly encourage you to find a copy. If you can't afford one, you should be able to find somebody with one. It took me awhile to find one, but I did.

How can people follow your work?

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RESEARCH CALL WITH ZACHARY CARLSON



This week we talk to Dr. Zac Carlson about a study that his group has done related to remove protected lysine with and without distillers grains and finishing diet.

Could you tell us about the project and how you came up with the idea to do it?

I have to admit I was involved with a rumen protected lysine project that Nebraska was doing as I was finishing my PhD. I was helping that student with their project, really got interested in it, and left before it was finished. I stayed in touch and followed through with some of the work they were doing. That seed was already in my head. University wide research in that area as it relates to beef cattle is coming back in scope. It was something that was done in the mid to late 90's into the 2000's then the ethanol boom came. We're coming back into that. I had already had that thought in my head. There might be something here. I don't really know. Certainly, an area of interest. That got accelerated when a good friend of mine, who is a feedlot consultant, called. Some of his coverage was up in Canada, so it relates highly to some of the feeding operations we may have here in North Dakota and in the upper Midwest in general. They were struggling in 2021 to source distillers due to whatever it might have been with labor shortages and inventory and so on. For a period of time, they were going to go without distillers. They really had no major protein source within that diet. They were entertaining bringing in lysine to look at least very low inclusions of lysine and bring on some of the research that's already been done. That really got me thinking and it was time to start doing some work up here. I had applied for a grant within the state of North Dakota Department of Agriculture. I didn't get that grant and decided to go on my own in a way with a lot of guidance from Dr. Kendall Swanson here at NDSU. We went ahead and figured out where we were going to do it. The research was conducted at the Beef Cattle Research complex here on campus. It's an individual feeding system of Insentec brand smart feeders. We had opportunity to have 72 animals, so we could do something like that in that area. Based on that and the availability of space limited us to about four treatments and that's where we came up with the negative control (corn silage and dry rolled corn-based diet; no added protein). Then we added rumen protected lysine into that diet as our positive control. Then we added distillers in replacing a portion of the dry rolled corn. We brought that diet to 20% dry matter basis was our target for distillers with and without lysine there. It's a 2x2 factorial. Taking that concept that I had talking with that feedlot consultant as well as where some of the more modern work has been optimizing amino acid requirements, selecting for that first limiting (lysine) with byproduct diets. Trying to boost performance in that situation.

Can you go over all of the treatments again?

- 1.Corn silage + dry rolled corn-based diet (no added protein)
- 2.Corn silage + dry rolled corn-based diet + rumen protected lysine
- 3.Corn silage + dry rolled corn-based diet + distillers (no added protein)
- 4.Corn silage + dry rolled corn-based diet + distillers + rumen protected lysine

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RESEARCH CALL WITH ZACHARY CARLSON



How much lysine were you including in the diet?

This is where maybe this project is a bit crazy. A lot of the past work has been in the scope of 1-9 grams of metabolizable lysine. I plugged those diets that you just described in. We were at 20% corn silage, 5% supplement, and then for that negative control, the balance is corn. Then again 20% distillers with the balance being dry rolled corn. I put those into the NASEM model to see what the model was telling us our metabolizable lysine balance was for what was missing in the diet. When I did that, these values are really high. There's lots of assumptions within those diets I modeled the diets. I didn't use the ingredients that we actually were feeding. I modeled those diets, saw what that difference was, and we added lysine in to try to meet that balance or get that balance to zero. Essentially meet that requirement that NASEM was suggesting based on that all the assumptions that we had in those animals. The levels were really high and probably are going to make me sound a bit crazy. We've seen some of the data on what happens when we go maybe a little too far, in this case. I'm looking at this in hindsight. It would have been a different conversation probably going into it.

We broke it down into phases. At reimplant time, we readjusted the model to see what it was suggesting based on the weights we had at that time. We readjusted lysine at that point. For the first 86 days for the diet without distillers, the lysine inclusion was 15 grams. That's metabolizable lysine without distiller's grains. The model with distillers was suggested to need 12 grams. Quite a bit. Like I said, most literature, I don't know if it goes much beyond somewhere 7-9 grams. We were way above in that sense. These are calf-feds, so we started the project last fall. At reimplant time (day 86) we re-evaluated that and it dropped down to still fairly high relative to previous work, 9 grams me for the diet without distillers and 6 grams for the diet with distillers.

What were the basal protein levels on your corn silage-based diet? Did you use urea in the diets?

We did use urea. The crude protein would have been much higher than a diet without urea. I do not remember off top my head what the protein values were in there, but I know we're just getting our results back from the lab of actually what was. The model diet came in 11.5-ish%. Somewhere right under 12%. Then you add that urea in and it brought it up to 12.5 or something like that. I don't quite recall. We fed a fair amount of urea. Trying to get as much of that microbial crude protein.

Do you have any result that you could talk about?

Getting started I just had some technicians. A student that took the project on last fall helped me start it, but he wasn't my student and he ended up graduating earlier than anticipated. We transitioned all the data onto one of my new students, Grady Gullickson. He's been taking that data down. He just started in August. He's been taking in all that. It's a brand-new master's student. We've been going through all of it. When you don't get to start something yourself, it's sometimes very hard to wrap your head around. We do have everything summarized. What we found out might not shock some people listening to this. I try to at least be conscious that in my position on both research and extension, more so extension, it needs to have direct application and a lot of sense to the end user.

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RESEARCH CALL WITH ZACHARY CARLSON



Based on costs, the 15 grams would be very difficult to pencil in on an economic basis. This study is pure academic question. We received product from the sponsor company but we but that was it. I was using some startup money just to kind of learn how research is done up here at NDSU on the other side of the table being a P.I. now. We thought if this is what the model is asking us based on all these assumptions that we've had, then what's the outcome with that result?

In the diet without distillers that had lysine it, we saw a decrease in dry matter intake. Average dry matter intake for these calf-feds was right around 22 lb dry matter. We saw about a pound of dry matter reduction of the overall from start to finish of the study for that treatment group that had lysine in it at that 15-gram level. At least for the first phase. That leads a lot into performance that we saw. We didn't see changes so much inefficiency, overall. Just simply lower intake, lower gain, and so lower final body weight in that sense. I mentioned we split up phase one and phase two. We did two weights halfway through the study and reimplant time and wanted to breakdown those sections because obviously as we know protein requirements go down on a concentration basis as the animal ages and gets further along into the days on feed. What we saw was that intake difference was much more evident within that first phase than it was in the second phase. It was significant within phase one for that pound reduction for those first 86 days. We're diving into this just to make sure what we're seeing is truly the effect of treatment and not variation we captured in another form. There's probably a good argument maybe for why this happened, but in phase two we did have a main effective of distillers grains where our two diets with corn had improved performance regardless of lysine above our distillers treatment. Obviously that's something that's interesting. It'll be a conversation that I'll have with Galen and Jim, I'm sure someday, about those differences there. We did pick that up in the second phase so that that last half. These cattle were on feed for a fair amount of time age wise. They were May calves, so little smaller to begin with. They were on feed for about 190 days with a subset second harvest out to 220 days.

Some people want to hear about the carcass differences. Now on mind you, 4 treatments 72 animals, individual feeding system. Replication was good in terms of individual animal. We had between 16 and 18 for those that stayed on trial. Our target was 18 per treatment, but we had some fall off. I tend to be leery about getting too heavy into carcass data. Just from the simple fact it's on 18 carcasses at most. I think some of this to be true. We didn't pick up a difference in hot carcass weight. The treatment that did not have distillers but had lysine had a numerically lower by hot carcass weight by 40 pounds. That goes back to our replication issue. We didn't pick that up, but it's certainly there and that's real in that sense. That tie back into performance of those animals throughout the trial. What we did pick up, and probably is one of the harder things to dive deeper into at this moment, is big differences in back fat thickness. If we look at the distiller's treatments alone, so diets without distillers, we saw a significant increase in back fat for animals fed no lysine or distillers. Almost a 0.15 compared to the diet with additional lysine and no distillers. I think that difference is probably more an impact of how that treatment of no distillers plus lysine performed throughout the entire trial.

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RESEARCH CALL WITH ZACHARY CARLSON



Reduced performance, reduce overall finish on those animals. I don't think there's that much. What's interesting is when we go to the distillers-based diets with and without lysine. We saw that same difference of about 0.15 back fat. We saw increased back fat with lysine in the distiller's treatment. I think it's an interaction because calves fed without lysine in the non-distiller's treatment and fed the treatment with lysine and distillers both had lower back fat. It was a simple effect interaction there between treatments. I don't want to blame the model or anything like that, but we're probably over supplying lysine. That lysine maybe got broken down as energy in that sense or something like that because we didn't see a performance difference between those treatments, but certainly where those animals were depositing back fat. Always be cautious of sample size especially in carcass data. For us, I know the genetics of these animals and they were spread out a bit. You have to take that into consideration.

Do you have any hypotheses as to why intake was decreased when fed lysine but no distillers?

There's been some of this work in swine that have looked at this. The instinct is to say maybe it's not palatable, but I still don't know a good way to measure palatability, whether it's a biochemical feedback mechanism in the animal or whether they didn't like the taste of it. I try not to perceive what they like. There's some work in swine that have showed some receptors that maybe when you're over supplying lysine, the excess lysine might be binding to other receptors, changing what the model would suggest. It's not accounting for that. Therefore, whatever mechanism that might be driving, whether it's a negative feedback on intake. I'm not exactly sure. I think that's somewhat there in some of the work that we're seeing not seeing differences or when we don't see differences all the time with lysine inclusions. Sometimes it's there and sometimes it's not. I wonder, are we chasing one answer to a multifactorial issue. We're trying to address it by meeting the first limiting, but it's altering everything completely after that. That was kind of what we've been seeing leading into this study. There's maybe some receptors in the small intestine. I believe that's where it's at that swine researchers uncovered.

What were some of the challenges you encountered with this research?

It probably had more to do with being new to North Dakota State University and learning. I had previous experience here as an undergrad and working at the facility that we did this project at. More so, probably logistical things in that situation stemming from randomizing animals and training them to the system. We had complications there. We started off targeting 72 but we had 71 animals trained at the system. We didn't start with 72. I think we started with 80 or so, but there were more than anticipated that didn't train into this system. It was slow going. Oddly enough, that system is outdoors. It gets pretty cold up here. We had some extreme cold weather with unusually cold moments within the January/February time frame. That system depends on a pneumatic system. It depends on air pressure to let the animal into the system and let them out. We had 20 days where it was cold enough that we could not measure intakes on those animals. We had to adjust partway through. We had randomized animals and treatments across pens, so there are still pens even though it's an individual feeding system. We had to change that because we had to anticipate whether we were going to get more cold weather and have issues with the system or not. It was a good call on our part now.

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RESEARCH CALL WITH ZACHARY CARLSON



We went to each pen being its own treatment, which we will have to block for that and consider that. That cold weather issue was really a big struggle for this project. Now we've addressed that concern. This fall they're changing up some of our fittings within that system so that we can hopefully withstand some of those cool temperatures.

Was the lysine top dressed or mixed into the ration?

For the most part, I believe a lot of these protected products get top dressed just due to whatever agitation and potential disruption there might be within the coating in a TMR. We used the product from Ajinomoto, Ajipro. The claim there on that product was that it could be mixed within the TMR. We mixed it within the total diet. The caveat being in silage-based diets that there's probably some fermentation activities, some microbial activity within that diet, within a period of time. They don't guarantee beyond 24 hours within that diet. That meant for us we had to scoop out every day in the diets with lysine. We did it for all treatments. We pulled that out each morning so that we didn't leave any residual diet in there.

What is next for your research related to this project?

Yeah, so bit of a pivot, but it's within the realm. There is an opportunity for North Dakota beef cattle producers. We're getting a few soybean crushing plants coming on. I think it might be 3 at this point, which is a tremendous increase in volume of soybeans that will need to be produced in this area, both on the East and West side of North Dakota. That means, hopefully, that there's some soybean byproducts. I don't think we can call soybean meal a byproduct anymore. There's going to be some of that. Along the lines of lysine, we're doing a project this fall. My research is going to be all over, but a lot of backgrounding. I think there's a lot of opportunities for producers up here to wean their calves and add some value to those calves before sending them on to the next phase. We're a cow calf state, for the most part. We're going to be feeding different levels of treated soybean meal. We're going to be replacing at a one-to-one inclusion of distillers grains. We're going to increase the amount of soybean meal in the diet. Where this loops back in there with the lysine project is soybean meal could be a source of lysine. If we're using a treated soybean meal product there's hopefully a little bit more rumen undegradable protein within product since that's the whole goal of treating soybean meal. We're going to follow this study of a feeding trial and a digestion trial to see how much lysine flow we're actually getting in these diets. Basically coming back into the realm of the what the literature is driving. We're going to feed 12% treated soybean meal at the highest inclusion. The model is showing about 3 grams of lysine on the balance side, so we'll see what we end up with in that in that regard. There's been some work that's come out of Kansas State showing that when we're providing some of this lysine, and they used rumen protected lysine, during the background phase but then not having it in the finishing phase there are some hot carcass weight differences within those treatments. We will hopefully finish these animals out without soybean meal on finishing diet and see if anything done in the backgrounding phase with soybean meal and lysine is impacting the carcass quality.



FEEDLOT RESEARCH BRIEF



Global Review of Beef x Dairy Crosses

Introduction

- Dairy x Beef studies are dated and do not represent the herds we see today.
- Dairy contributes substantially to the beef produced in many countries:
 - New Zealand = 65% directly or indirectly
 - Russia = 87%
 - Sweden = 60%
 - Finland = 80%
 - US = 20-22%
- Globally, competition of other land uses with beef herds may drive genetic decisions of dairy herds to improve beef output.
- Global interest in dairy x beef crosses is increasing due to:
 - Improve reproductive performance of dairy herd
 - Exploiting hybrid vigor
 - Reduced dairy herd expansion (don't need as many replacement heifers)
 - Use of sexed semen to get replacement heifers
 - Economic resilience
 - More acceptance of dairy x beef crosses
 - Easy calving and shorter gestation
 - Welfare of bull calves

Global Trends

- Decreasing or steady dairy herds (in some countries) and increased cow longevity leads to lower heifer needs
 - More opportunity for beef x dairy crosses
- Changes in dairy genetics can have negative effects on beef production of dairy animals.

Selection

- In Nordic countries, of beef x dairy crosses, 41% sired by Belgian Blue and 28% sired by Blonde d'Aquitaine.
- A lot of variation within and between breeds.
- 1.85 more calving difficulty events can be expected per 100 dairy cows inseminated with beef semen.
- It is expected that genetically inferior females and older females will receive beef semen.
 - In Ireland, cows in the bottom 10% of the herd for genetic merit are 2.9 times more likely to receive beef semen than females in the top 10% of genetic merit of the herd.

Production Systems

- European management systems include more extensive grazing systems for dairy steers
 - Ireland: two main systems slaughtering at 21 or 23 months of age.
- Global beef x dairy systems rely on similar systems, taking advantage of a younger age at slaughter and grazed pasture to keep costs low.

Beef Performance

- Beef x beef animals have heavier and more conformed carcasses than beef x dairy animals.
- Differences early in rearing for animals born in dairy and beef herds can have effects on performance through growth and finishing.
 - These are additive to genetic merit differences of the parents.
- Extrapolation of performance data across country borders should be done cautiously.
- Large genetic performance differences exist between breeds, particularly between continental and British breeds.
- Dairy x beef crosses are expected to perform somewhere between the breed affects of the parents.
 - Hybrid vigor is a function of genetic distance between the dairy breed and beef breed, which will be greater than differences between beef breeds.

Calving Performance

- Calving difficulty tends to be less for dairy crossed with British breeds compared to continental breeds.
- There has been a greater incidence of calving difficulty for calves sired by late maturing beef breeds compared to dairy and early maturing sires.
- Calving ease is one of main reasons British breeds tend to be most frequently used in dairy crosses in temperate regions.
- Differences in gestation length has been noted
 - Angus x dairy = 281 d gestation length
 - Blonde d'Aquitaine x dairy = 289 d gestation length
- Reports of greater calf mortality for Charolais and Blonde d'Aquitaine dairy crosses compared to Angus, Hereford, Belgian Blue, and Simmental sires.



FEEDLOT RESEARCH BRIEF



Global Review of Beef x Dairy Crosses

Growth and Efficiency

- The energy requirement for dairy breeds relative to their weight is greater than beef breeds due to high activity of internal organs and fat depots.
- Daily feed intake between dairy and dairy x beef crosses growing animals does not appear to be different.

Carcass continued

- Fat color of Jersey carcasses are more yellow than other breeds.
- Recent data comparing meat quality of beef x dairy crosses vs beef and dairy breeds is sparse.
- Advances in knowledge of animal management for beef x dairy crosses may mitigate breed differences in meat quality.

Carcass Characteristics

- Lighter carcasses with poor conformation tend to have lighter primal cuts.
- Dairy x beef crosses, especially those crosses with late maturing beef breeds, tend to have higher carcass weights compared to dairy x dairy carcass weights.
- Jersey cattle have lighter carcass weight compared to most other dairy and beef breeds.
- Carcass weights of Holsteins tend to be lighter than those of continental breeds, but tend to not differ from British breeds. Carcass weights of beef x dairy crosses are expected to be somewhere in between.
- Differences in carcass weight between Jersey and Holstein cattle can be decreased by crossing with beef breeds.
- Length of Holstein carcasses are a concern for processors
 - Holstein carcass length = 135.1 cm
 - Beef carcass length = 127.6
- Carcass conformation in beef x dairy crosses are almost always superior to dairy animals.
- Similar carcass weights of Holstein and Angus coupled with only a small difference in primal cut yield implies there may be little difference between purebred dairy vs beef x dairy crosses.
 - Important due to popularity of using angus in dairy crosses
- Beef x dairy crosses tend to be fatter than dairy animals.
 - If processed at the same weight, dairy x beef animals with late maturing sires will have leaner carcasses.
- Recent evidence of marbling differences between dairy and beef x dairy crosses is sparse.
- At the same live weight, dairy animals will have a lower dressing percentage.
 - Largely due to greater weight of internal organs, gastrointestinal tract, and non-carcass fat.
 - Dressing percentage of beef x dairy crosses should be somewhere between the parents.

Environmental Assessments

- Per unit of product produced, compared to beef herds, dairy herds had:
 - 41% lower global warming potential
 - 41% lower acidification potential
 - 49% less land use
- This is because 83-97% of environmental affect of dairy herds is attributable to the dairy they produce
- When comparing only growing animals in both systems, emission intensities were similar.

Genetic Assessments

- Without genetic evaluations across breeds, it is difficult to assess the benefits and drawbacks of individual sires within breeds.
- Comparing the genetic merit of potential sire for all breeds would make sire selection easier.
- Poor recording of sire and performance for crossbred animals has led to a gap in performance data to use for genetic evaluation of the sires.
- 75% of calves with a dairy sire had the sire recorded. Only 52% of dairy x beef calves with a beef sire had the sire recorded.
- Poor recording of sire for beef x dairy crosses are due to:
 - It is seen as unimportant
 - In some areas, natural mating is the norm for crossbred dairy animals.
- Performance data for a great deal of the calves lives born in dairy herds are not available or recorded.
- Many traits of relevance for beef x dairy production are highly heritable.



FEEDLOT RESEARCH BRIEF



Global Review of Beef x Dairy Crosses

Breeding Goals

- Breeding goals are a list of important traits used to select animals to use in breeding programs.
- Of 21 breeding goals assessed globally, 13 included some emphasis on body size or weight.
 - Few included emphasis on performance of offspring for beef.
- Custom selection indexes exist to help weigh the different breeding goals being used in selection.
 - This allows producers to alter weighting for larger groups of similar traits instead of having to weigh and organize a larger number of individual traits.
- Producers not interested in beef production can remove those subgroups from the analysis.
- Breeding goals for beef x dairy crosses can be helpful in selecting suitable sires for the program.
 - These goals would address both the needs of the dairy producer to maximize profit from the lactating female and requirements of the beef sector.
 - Indexes to manage breeding goals exist for use of beef semen in beef herds, but this would not be appropriate for use in dairy herds.
 - Current beef x dairy indexes do not include the effect of the sire of the calf on the reproductive performance of the dam in the future. Calf breed can significantly affect future reproductive performance of the dam.
 - An affect of using beef semen in dairy animals has been seen to affect dairy cow milk performance.
 - Any indexes developed need to be transparent and validated to be accepted into and industry.
- Performance testing of bulls has become less standard in some areas.
 - Performance testing bulls may warrant reconsideration as the dairy herd continues to contribute to the beef output and many traits can be measure in growing animals.
 - Many traits that contribute to dairy-beef indexes are measured early in life, making it easier to measure these outputs.
 - These traits are typically not sex-linked and highly heritable.
- The role of crossbred beef sires should not be discounted as they can provide a complementarity for dairy x beef crossbred calves.

Breeding Goals continued

- Co-ancestry between the beef and dairy population will be very low.
 - Once inbreeding is managed on the seedstock side, inbreeding will not be an issue with beef x dairy crosses.
- Use of bulls for natural mating can be an issue when there is a low reliability for genetic evaluations.
 - Male fertility needs to be considered in beef breeding programs.
- Indexes need to be produced to identify which animals will receive which semen and what will be done with each offspring (beef production, etc).
 - Genetic merit and parent genetics should be included
 - Calving ease and reproductive performance after first crossbred calving are important to consider.
- Decision making may change from looking at the average risk to the variation that risk has.
 - i. e. a producer may opt for a bull that produces more homogeneous birth weights so there are no extremely large calves associated with calving difficulty, but may otherwise be genetically poorer for calving difficulty.

Decision Support Tools

- Producers can use these tools to make on farm decisions for their herd.
- Breeding companies can use the tools to identify suitable bulls for specific herds.
- If the tool is able to predict carcass qualities, it can benefit cattle buyers.

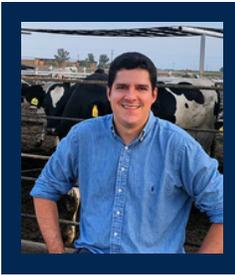
<p>S Strengths</p> <ul style="list-style-type: none"> • Potential to use AI and associated elite genetics • Availability of breeding/mating tools • Additional source of cash flow; cushions against volatility in milk price • Low initial capital investment for beef farmer (if purchased post-weaning) • No beef cow overhead to recuperate • Calves generally readily available 	<p>W Weaknesses</p> <ul style="list-style-type: none"> • Poorer primal cut yields relative to beef animals especially from Jersey bloodlines <ul style="list-style-type: none"> ◦ Yellower fat associated with Jersey bloodline • Impact of calving performance on cow productivity • Beef contributes little to dairy herd profit • Greater labor requirements (and infrastructure) preweaning • Low profitability beef sector • Volatile markets
<p>O Opportunities</p> <ul style="list-style-type: none"> • Removes the necessity for bobby calves • Sexed semen and dairy-beef breeding indexes • Potential for strong vertical integration between dairy and beef (and other) sector • Specialized (high health and highly skilled) rearing units • Potential to utilize unused resources/infrastructure • Growing demand for animal-based protein • Increasing consumer awareness of environment • Niche markets (e.g., veal) • Increasing demand for processed meats • Productive F₂ beef cow 	<p>T Threats</p> <ul style="list-style-type: none"> • Consumer perceptions <ul style="list-style-type: none"> ◦ Calf welfare ◦ "Industrialized" farming • Imposed policies (i.e., retention of calves on farms) • Less resilience to changing markets and prices • Competition from dairying for land/feed • Oversupply of poorer grading cattle could contribute to a lower price • Veganism/vegetarianism/flexitarianism • Poor uptake by beef farmers to rear dairy-origin cattle

CONTACT

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