Alpha-Gal Syndrome (Red Meat Allergy) Listening Sessions

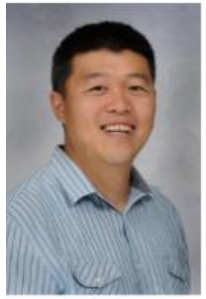
1/15/25 Salina – KSU Salina Campus

1/17/25 Parsons – KSU Southeast Research and Extension Center

2/4/25 - Online only (Zoom)

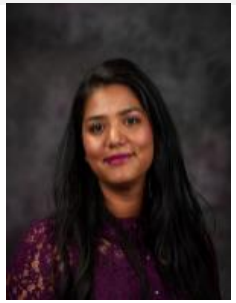
KANSAS STATE UNIVERSITY

Who are we and how it got started?



Michael Chao
Associate Professor in Animal Sciences and Industry
243 Weber Hall
Manhattan, KS 66506
mdchao@ksu.edu

Yoonseong Park
Professor in Entomology
32W. Waters Hall
Manhattan, KS 66506
ypark@ksu.edu



Priscilla Brenes
Extension Assistant Professor in Food, Nutrition, Dietetics, and Health
245 Justin Hall
Manhattan, KS 66506
pbrenes@ksu.edu

- Overwhelming number of ASI students and stakeholders expressed concerns about red meat allergy
- Met Dr. Park at Biochemistry seminar and began talking about a potential project to help Kansans with red meat allergy
- Connected with Dr. Brenes who has worked on surveying Kansas rural community through extension network

Funded Project - Cultivating Awareness and Resilience Against Alpha-Gal Syndrome (AGS) in Rural Kansas

Global Food Systems

K-State Today

Supported by K-State's Economic Prosperity Plan -result in innovation and knowledge that will fortify Kansas' leadership role in the food system

Current Issue
Archive
Contribute
Guidelines

Other publications

K-State Olathe newsletter
Global Campus' WorldWide Wildcats
K-State Research and Extension newsletter

Other resources

In the news
Job opportunities

May 31, 2024

Global Food Systems Seed Grant awardees announced

Submitted by the Office of the Vice President for Research

The Office of the Vice President for Research announces the recipients of the 2024 Global Food Systems Seed Grant Program.

The funding supports innovative research in all aspects of global food systems, especially projects that promote job creation and economic development in the state of Kansas, are interdisciplinary, engage graduate or undergraduate students, and partner with Kansas-based industry.

Awardees and their project titles:

- Michael Chao, animal sciences and industry; Yoonseong Park, entomology; and Priscilla Brenes, food, nutrition, dietetics and health, "Cultivating Awareness and Resilience Against Alpha-Gal Syndrome (AGS) in Rural Kansas," $199,968.

In this issue

News and research

- Global Food Systems Seed Grant awardees announced

Events

McCain Performance Series season ticket subscription packages return June 3

Join a faculty discussion on 'AI in the Workplace'

Summer undergraduate research programming available

Human resources and

Kansas State University

Objectives of the research

Phase 1 - Conduct surveys to assess AGS prevalence in the Kansas rural community through KSU extension network – current work

Phase 2 - Conduct interviews to document dietary/societal challenges of AGS patients in rural Kansas

October 22, 2024

Help Us Understand Alpha-Gal Syndrome (AGS) in Kansas

Submitted by Priscilla Brenes

Help Us Understand Alpha-Gal Syndrome (AGS) in Kansas – Participate in Our Research!

Are you an extension agent or community member interested in contributing to groundbreaking research on Alpha-Gal Syndrome (AGS)? Our team at Kansas State University, led by Dr. Michael Chao, Dr. Priscilla Brenes, Dr. Yoonseong Park, and Graduate Research Assistant Paige Tegeler, is studying the prevalence of AGS in Kansas and the challenges faced by those affected.

We Need Your Insights!

We invite you to participate in a short, 10-minute survey to share your thoughts and experiences related to AGS. Your responses will help us improve AGS awareness and support of those living with this condition. Participation is voluntary. As a thank you, you can opt-in to receive a $25 Amazon gift card for completing the survey.

Want to contribute? Click the link below to participate:

https://kstate.qualtrics.com/jfe/form/SV_3jXXeNU7nBQ6hiC

Connect with Us

Want to learn more? Visit our booth at the KSRE Annual Conference Resource Fair or reach out to Paige Tegeler at aptegeler@ksu.edu for more information.

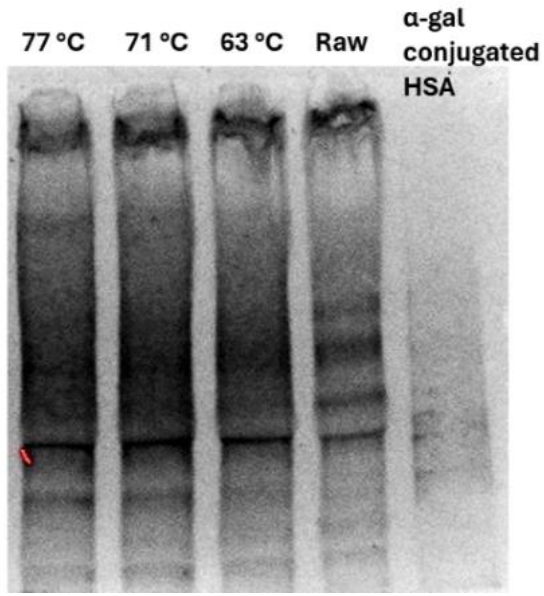
Thank you for helping us shed light on this important issue!

KANSAS STATE UNIVERSITY

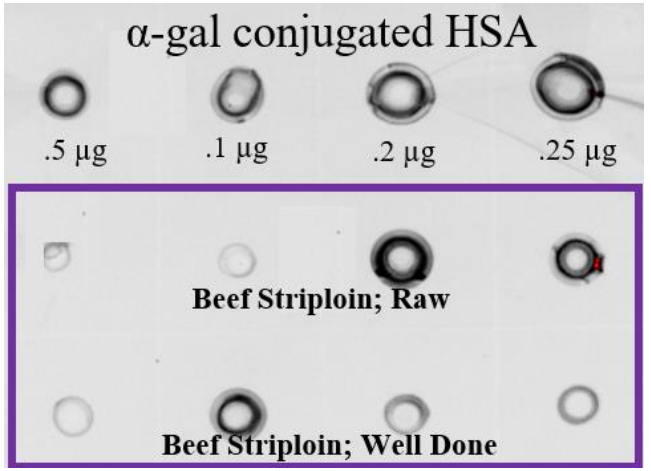
Objectives- continued

Phase 3- quantify α-Gal content in various food and pharmaceutical items

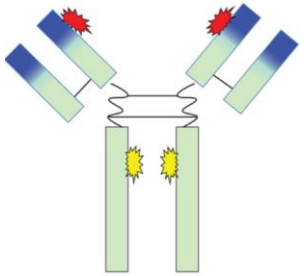
Phase 4 - using a α-Gal knockout mouse model to understand the relationship between α-Gal content and allergic reaction



Western blot demonstrating cooking does not decrease α-gal content in protein of beef



Preliminary α-gal fat blots showing α-gal's heat stability in lipid of beef



Objective 4: Understand the relationship between red meat consumption and blood α-Gal IgE antibody production in AGS patients using a mouse model

Step 1: Sensitize α-Gal knocked out mice with tick salivary gland extract

Step 2: Feed sensitized α-Gal knocked out mice various red meat products with α-Gal content previously quantified in task 1

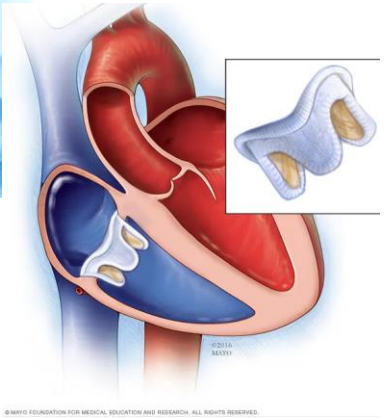
Step 3: Collect blood from mice to measure their blood α-Gal IgE antibody level by ELISA after food challenge

KANSAS STATE UNIVERSITY

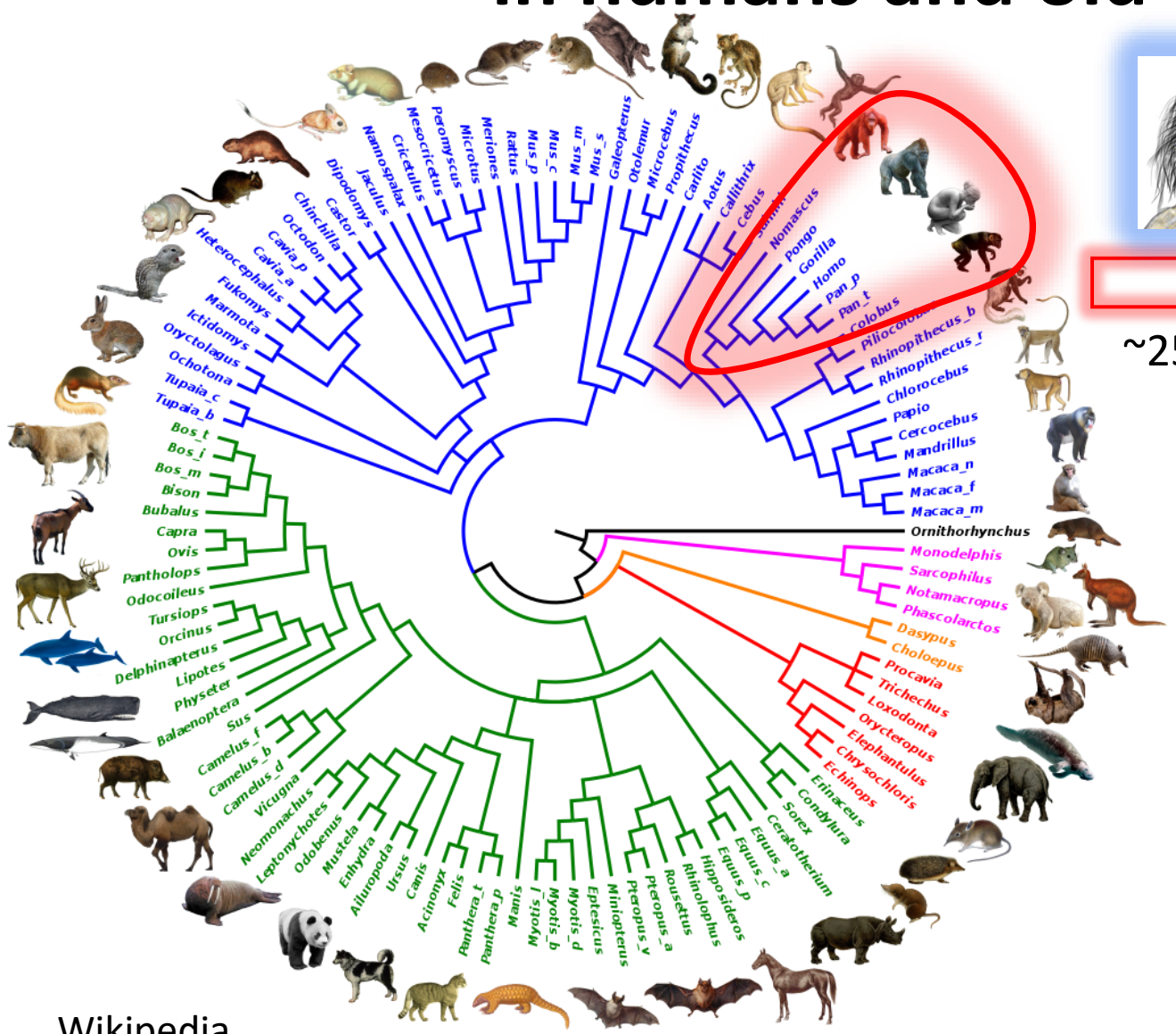
What is Alpha-Gal Syndrome?

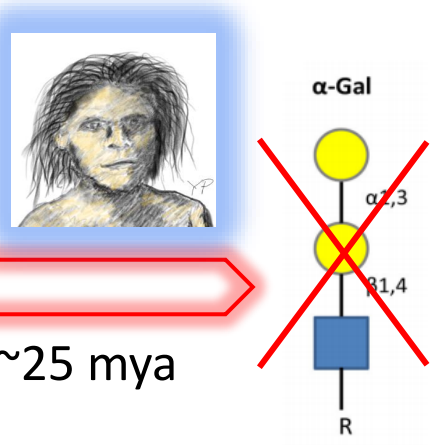
Red meat allergy ≅ Alpha-gal syndrome (AGS)

- Allergic responses to dietary red meat + any red meat-derived products
- Allergic response to some animal-derived monoclonal antibodies (Cetuximab against cancer) and to other vaccine products
- Rejection of transplanted porcine cardiac valves

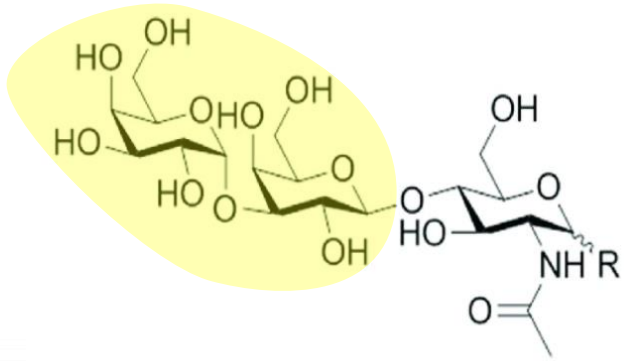


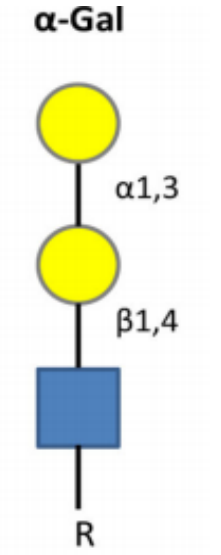
Alpha-gal (aGal) is a common glycan in all mammals except in humans and old world monkeys

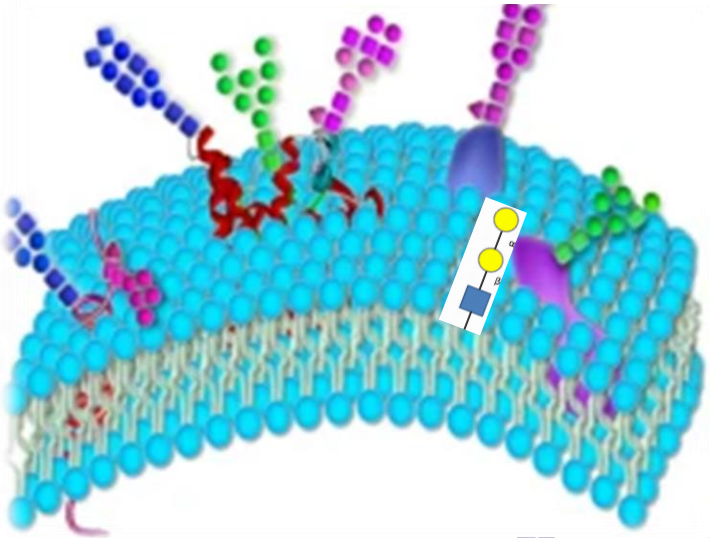




~25 mya





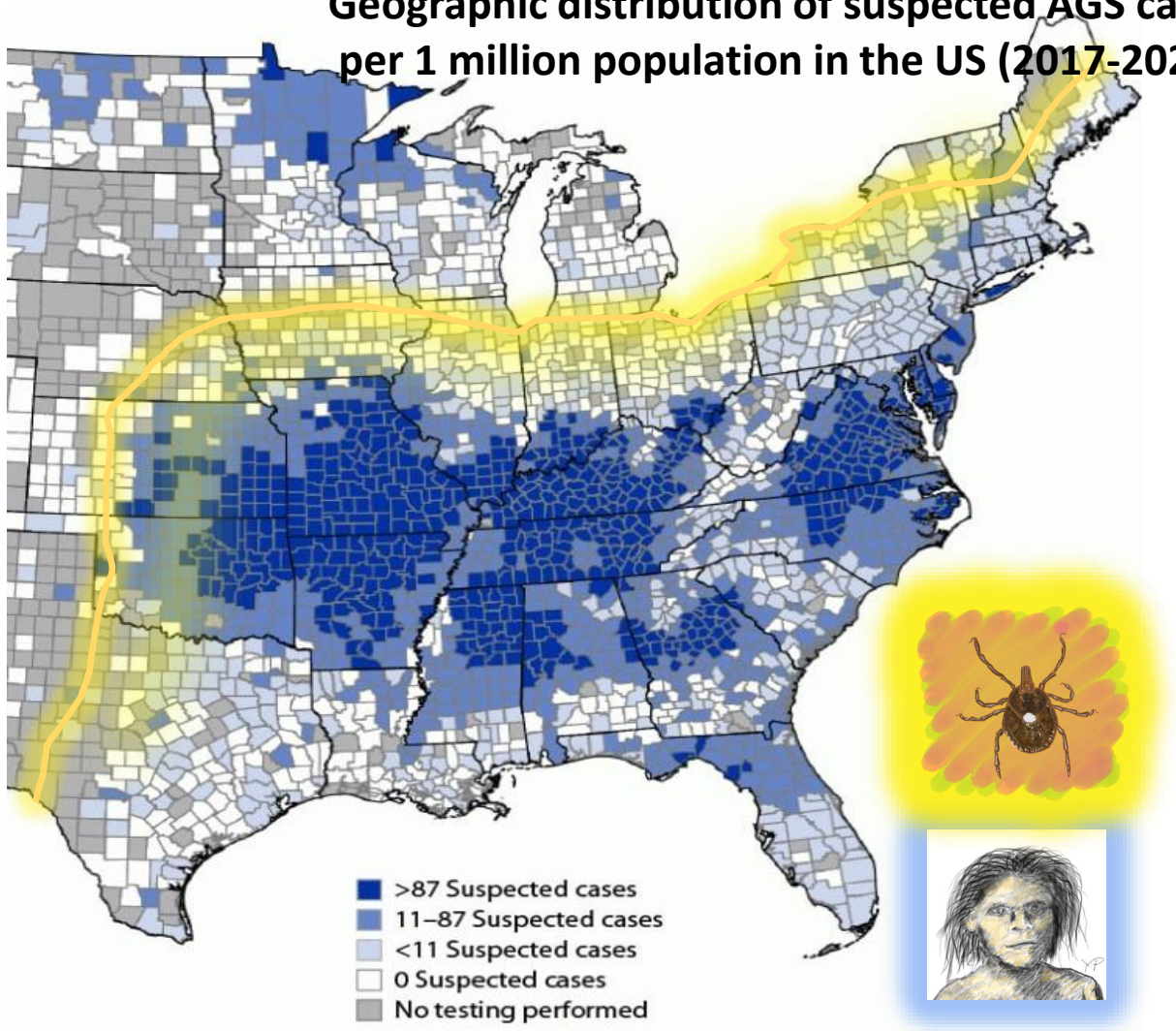


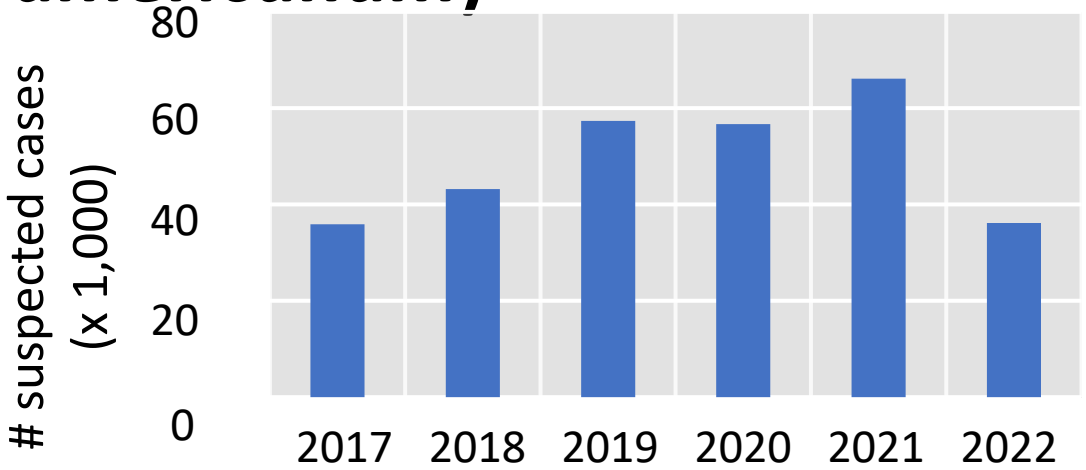
Wikipedia

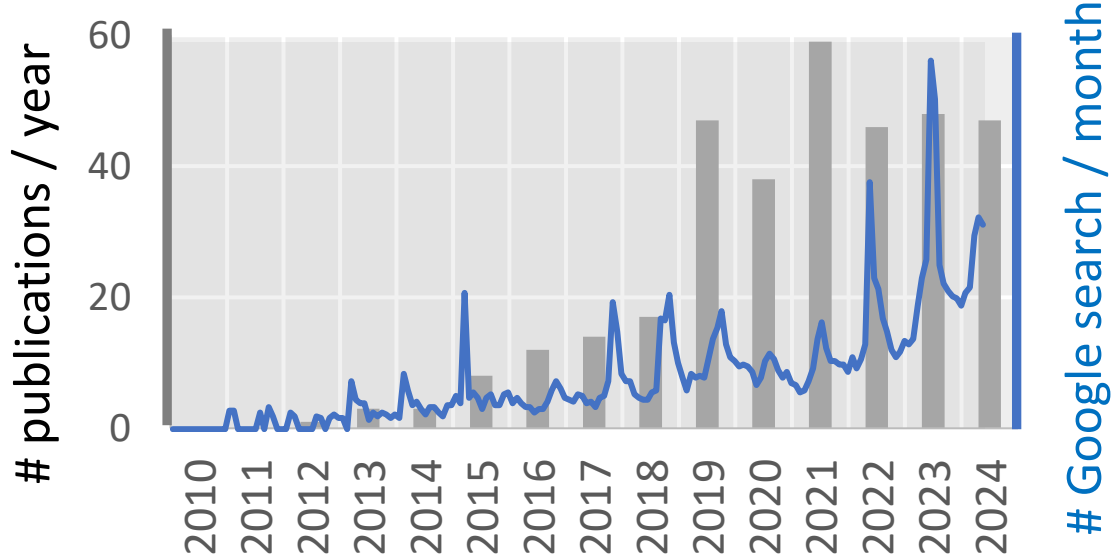
KANSAS STATE UNIVERSITY

AGS is associated with the distribution of the lone star tick (*Amblyomma americanum*)

Geographic distribution of suspected AGS cases per 1 million population in the US (2017-2022)







Thomson et al., 2023

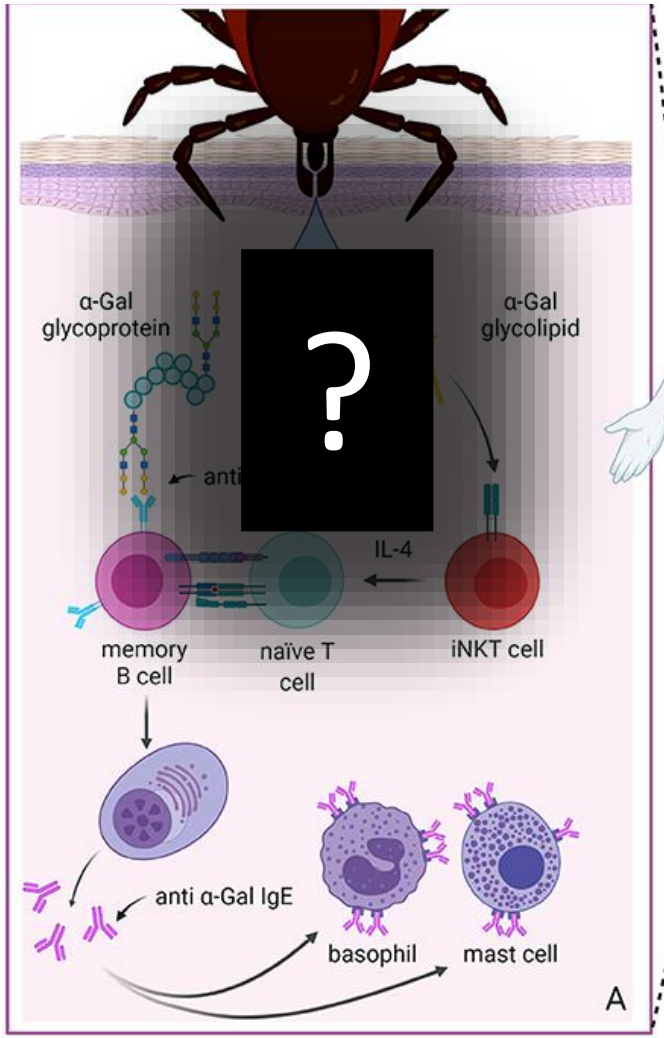
KANSAS STATE UNIVERSITY

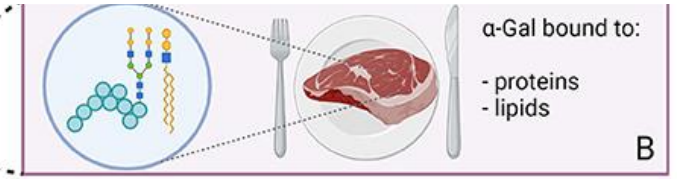
Tick saliva contains the alpha-gal sensitizer in AGS

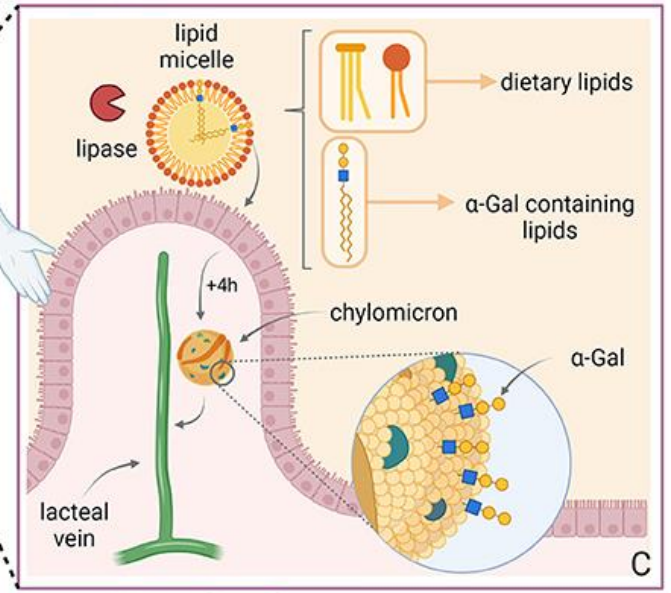
1. Sensitization

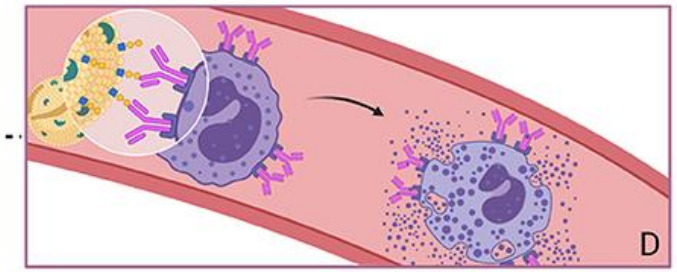
2. Elicitation

>100 bioactive molecules including immunomodulators









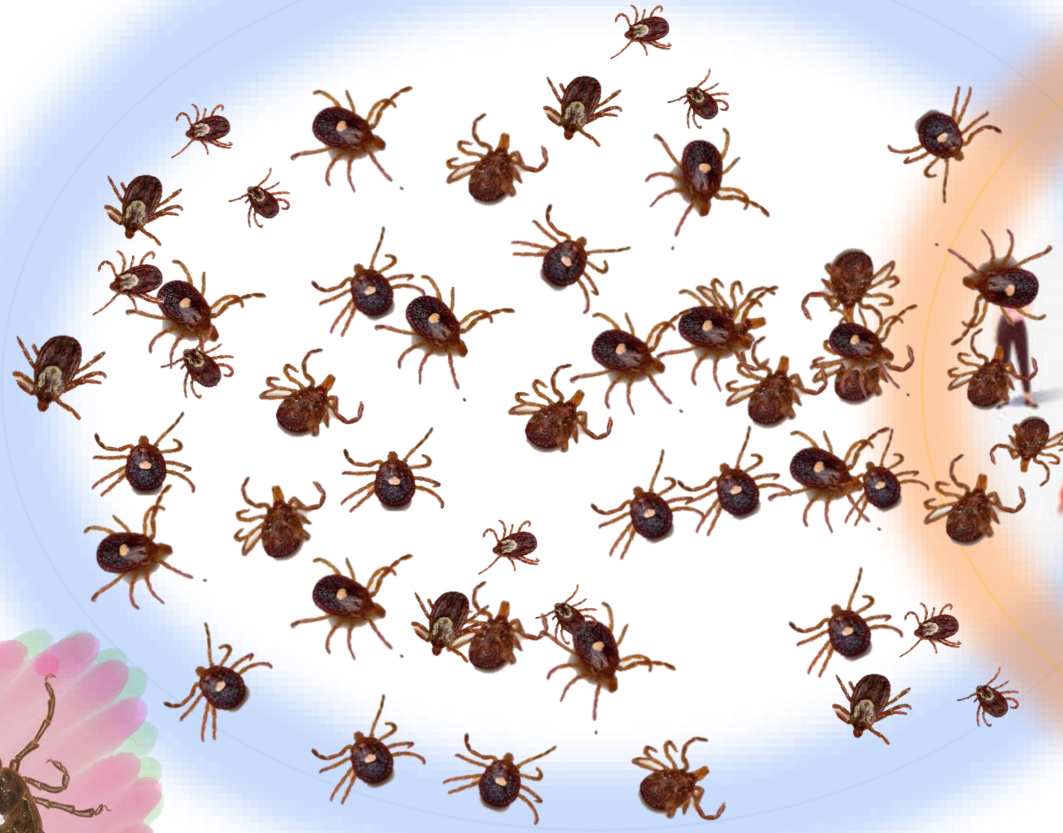
Román-Carrasco et al. (2021) Front Allergy

KANSAS STATE UNIVERSITY

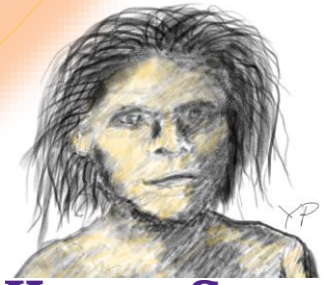
Only 1 to 8 % people bitten by ticks develop AGS

Is every tick bite the culprit of AGS?

Is everyone susceptible to AGS?



Identifying the risk factors

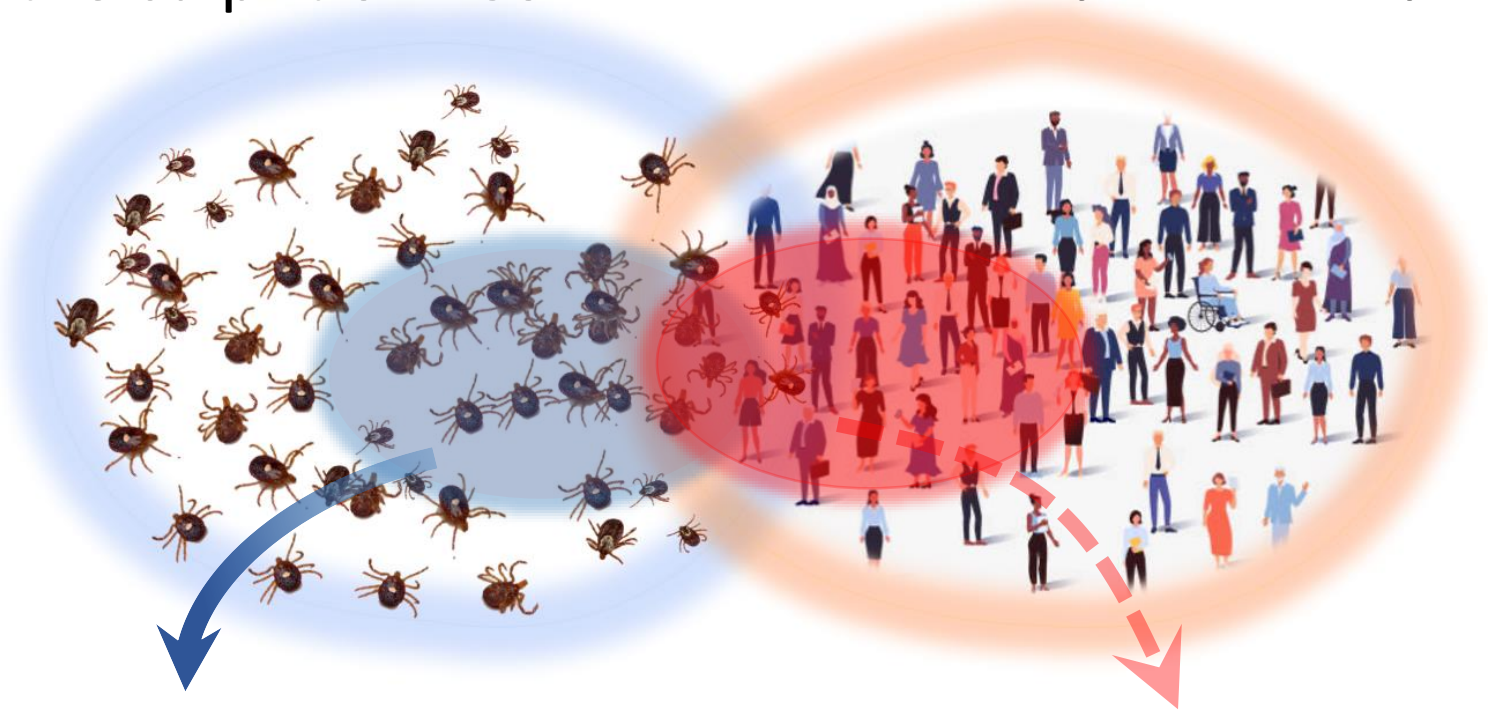


KANSAS STATE UNIVERSITY

Current Conclusions and Studies

Is every tick bite the culprit of AGS?

Is everyone susceptible to AGS?



- Higher AGS risk when bitten by the ticks with high levels of aGal saliva
- Another xenoglycan Neu5GC?

Intrinsic risk factors

High Risk Food Items for AGS patients

Interesting Facts

By definition, all people with AGS have allergic reaction to red meat, but:

- X2 as many people react to organ meat, especially pork kidneys

- 10-33% of people with AGS react to dairy products

- 10% of people with AGS react to gelatin in foods

- 1-2% of people with AGS react to carrageenan in foods

- <1% of people with AGS react to trace amount of alpha-gal from cross-contamination

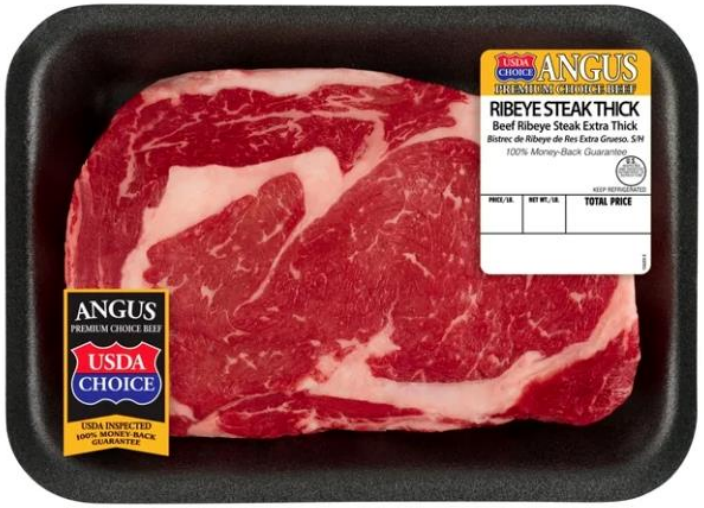
Food-Related Risks

Risk

- Organ meat like kidney, heart, liver
- Muscle tissue
- Animal fat (lard and tallow)
- Dairy product
- Gelatin
- Carrageenan
- Cross-contamination

Kansas State University

How much alpha-gal are in different meat products?

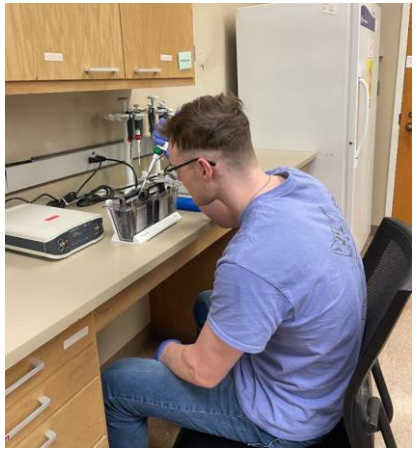


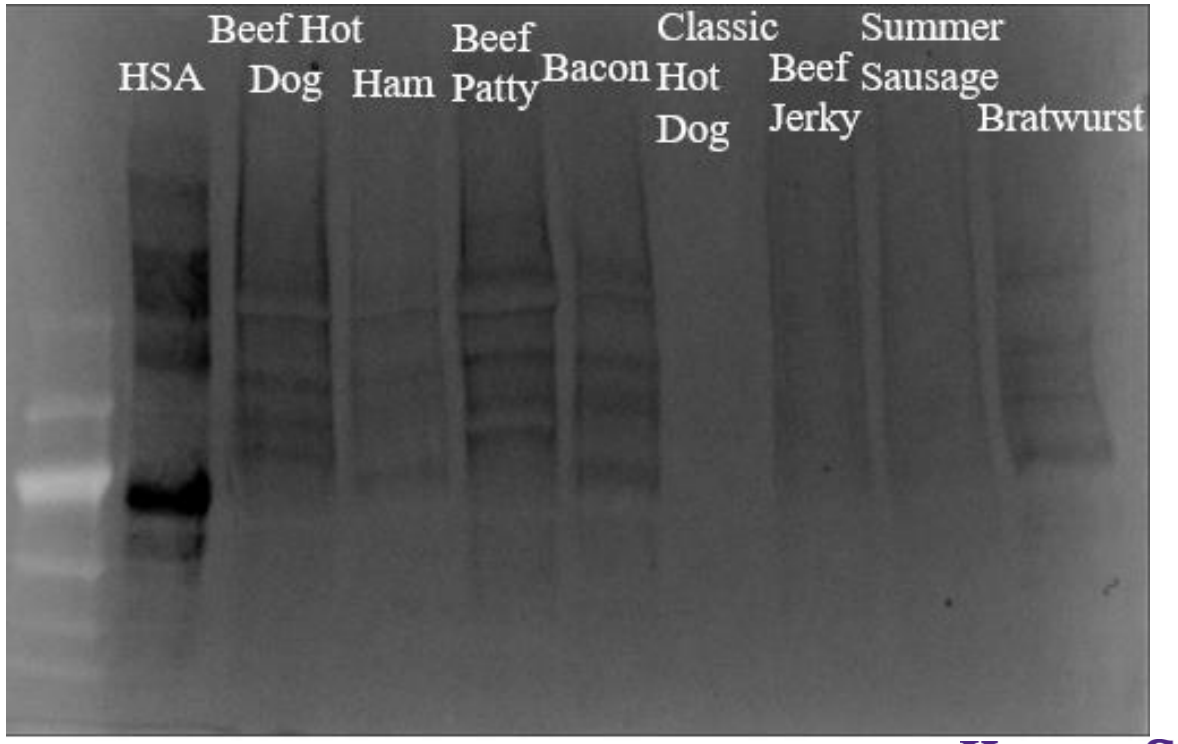
KANSAS STATE UNIVERSITY

Current on-going research

- Purchased 14 different meat products:
  - Beef striploin – raw and cooked
  - Pork loin – raw and cooked
  - Lamb chop – raw and cooked
  - Brats – cooked
  - Beef franks – cooked
  - Frozen beef hamburger – cooked
  - Beef jerky
  - Bacon – cooked
  - Summer sausage
  - Deli ham
  - Classic frank – mostly chicken

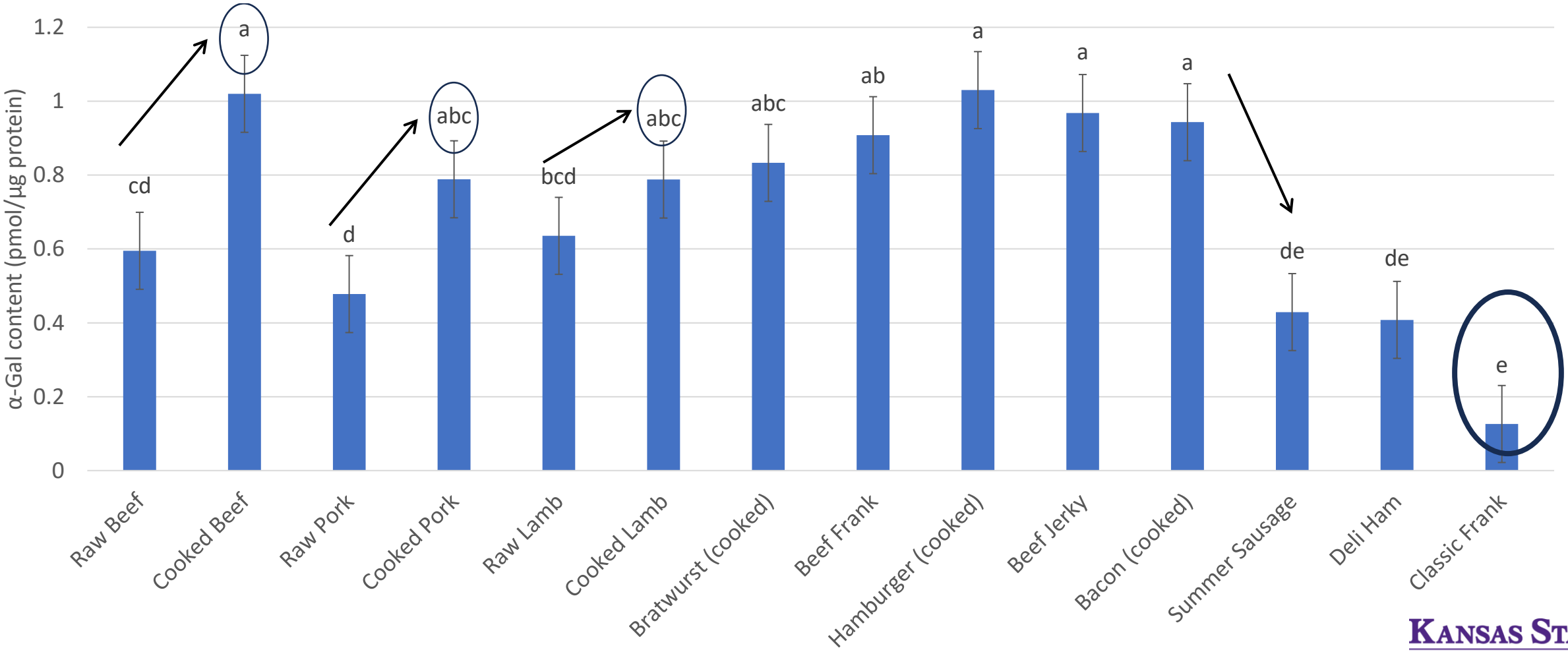
Extracted the protein and conducted western blots to estimate the amount of alpha-gal in the protein of each product





KANSAS STATE UNIVERSITY

α-Gal content in commonly consumed meat products (on-going study)

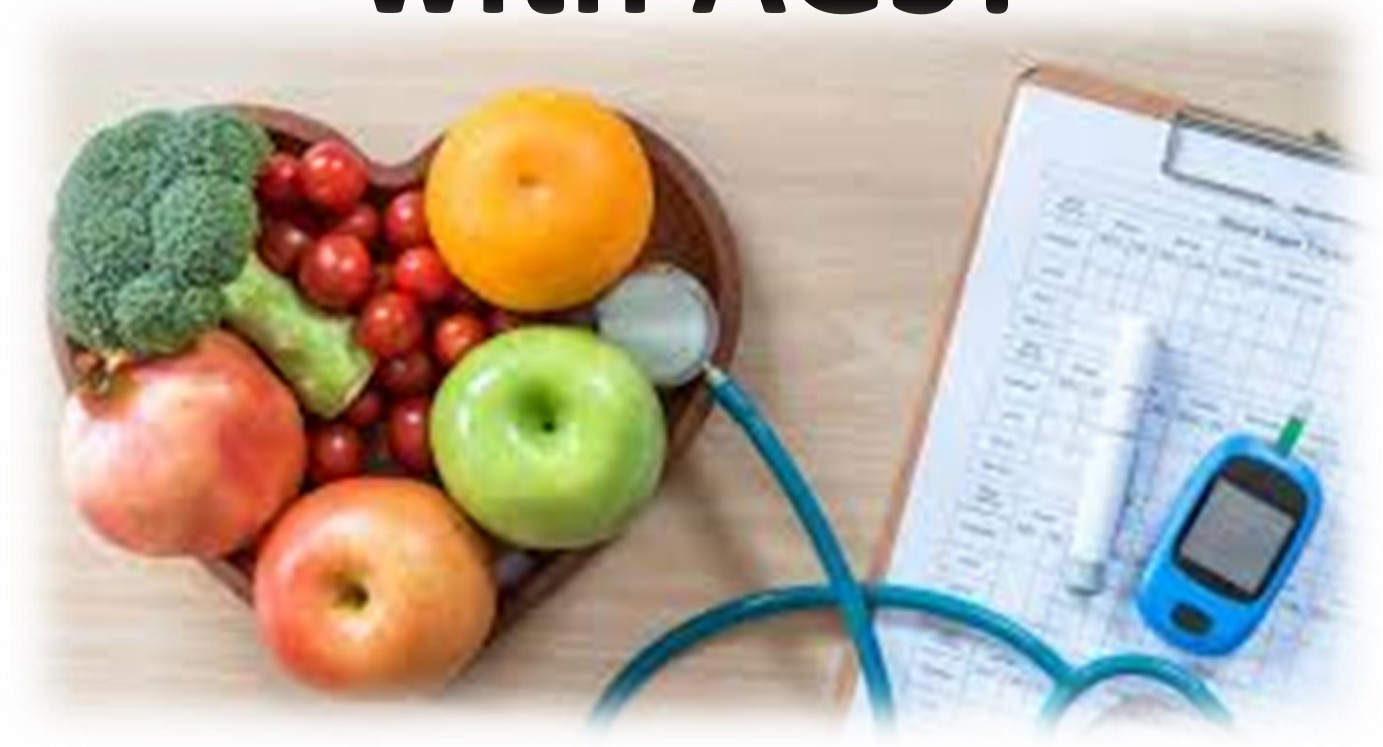


KANSAS STATE UNIVERSITY

Reactions vary from person to person

- If you **avoid ticks**, your alpha-gal IgE may decrease over time, and you may become less reactive
- 80% of AGS patients recover after 5 years without tick bites
- Follow the steps below Mayo Clinc to avoid tick bites:
  - Cover up
  - Use bug spray containing at least 20% deets
  - Check yourself and your kids
  - Shower immediately
  - Remove ticks quickly

What are some nutritional considerations for people living with AGS?



Nutrition considerations for people living with AGS

- Treat it like any other allergy:
  - avoid the allergen
  - avoid cross-contamination
  - reading labels
- Sensitivity is variable, so nutrition recommendations might be slightly different.
  - More sensitivity = more restriction = more nutrients of concerns

Foods to consider

- Red meat like beef, pork, lamb, deer including
  - Innards like pork kidney, liver, heart, intestines, pork gut casings for sausages
- Lard (often added to refried beans, vegetables, baked goods, tortillas, chips, fried food)
- Dairy products such as milk, cheese, yogurt, butter
- Protein powder from mammals such as cows, goats, sheep, buffalo, etc
- Gelatin in foods like gummies, supplements, marshmallows.
- Carrageenan in foods like dairy free products, poultry products, others
- Cross-contamination

NSAIDs, exercise, and alcohol may increase the risk or severity.

Nutrients of concern and their functions

Nutrients

- Protein
- Calcium
- Phosphorus
- Vitamin D
- Collagen

Function

- Build and tissue repair and structure (muscle, skin, hair).
- Enzyme, hormone, immune functions (signals in our body)
- Maintenance of strong bones and teeth and calcium absorption
- For energy production

Nutrients of concern and their functions

Nutrients

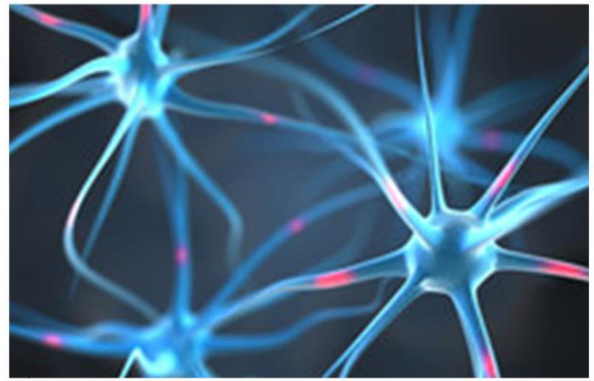
- Iron
- Vitamin B12
- Folate

Function

- Blood production (red blood cells)
- Energy and immune function
- Production of new cells
- Anemia prevention

Nutrition is not only nutrients but also social interactions and mental health

Nutrients of concern and their functions



Nutrients	Function
• Zinc	• Immune function and wound healing
• Selenium	• Cells growth and repair
	• Antioxidant capacity
• Vitamin B2	• Healthy nerve function (brain health)
• Phosphorus	• Conversion of food into energy

How to keep the balance?

- More inclusion of poultry and fish
  - Some people might not like these items, so they need to be more vigilant of nutrient deficiencies
- Supplementation – read labels, most vitamin D3 comes from mammals (look for vegan products) – always seek medical or dietitian advice for this.
- More plant foods

More plant foods?

- For protein and iron: Lentils, chickpeas, black beans, kidney beans, tofu, spinach, quinoa, pumpkin seeds, and fortified cereals (add vit C foods)
- For calcium, vit D and vit B12: Fortified plant milks, cereals, and nutritional yeast

More plant foods?

- For selenium, zinc, and folate: Leafy greens, legumes, broccoli, nuts and seeds.

- An eating plan with adequate amounts of plant-based foods does not mean avoidance of all animal-based foods.

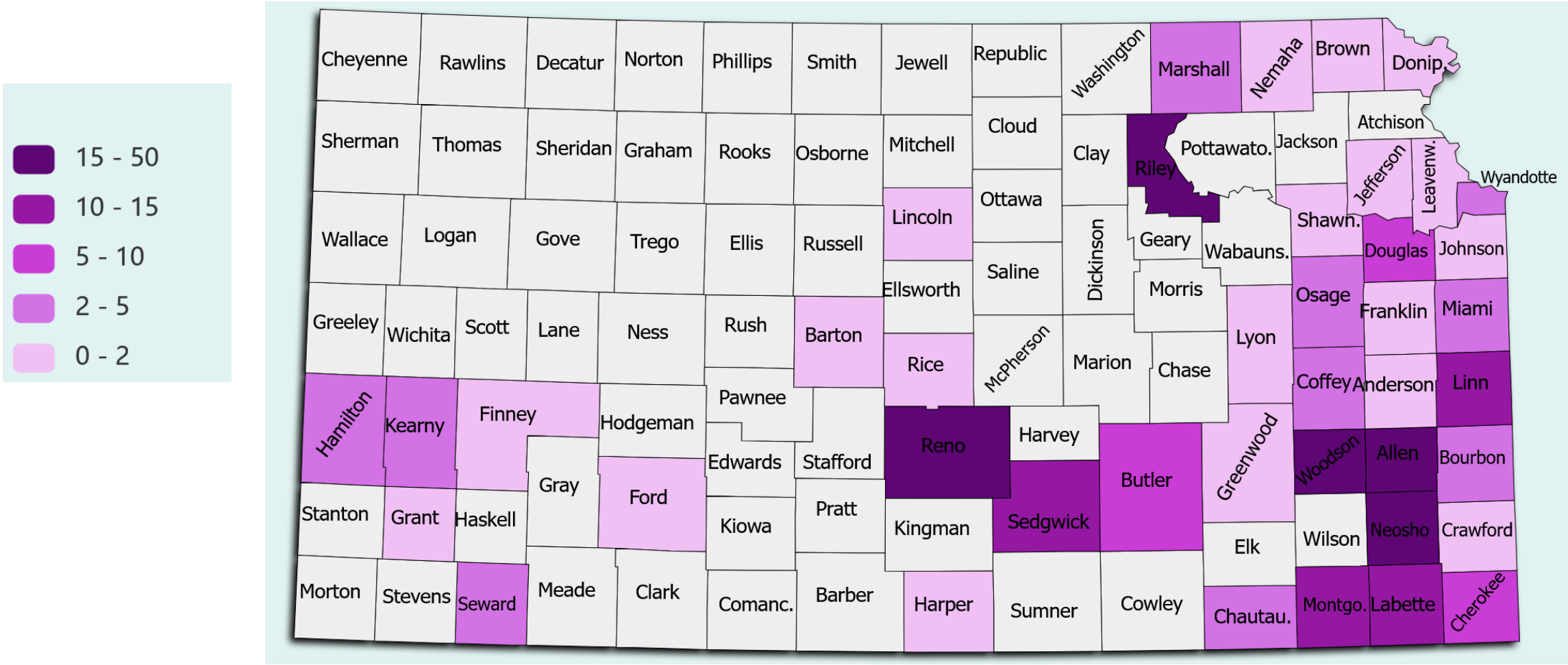
Current Research Findings from Surveys Completed Kansas Extension Agents

KANSAS STATE UNIVERSITY

Results from our AGS survey to KSRE professionals

- Total of responses: 144 Extension professionals
- 86% heard of AGS
- 84% knew AGS related to tick bites
- 61%% think there is not enough information about AGS for the public, and 31% are not sure
  - Underdiagnose, recently catalog as an affliction, restaurants are unfamiliar
  - Basic information about this and tick-borne diseases in Extension
- 55% feels worried sometimes or always about tick bites

Map of Kansas and AGS hotspots - Survey

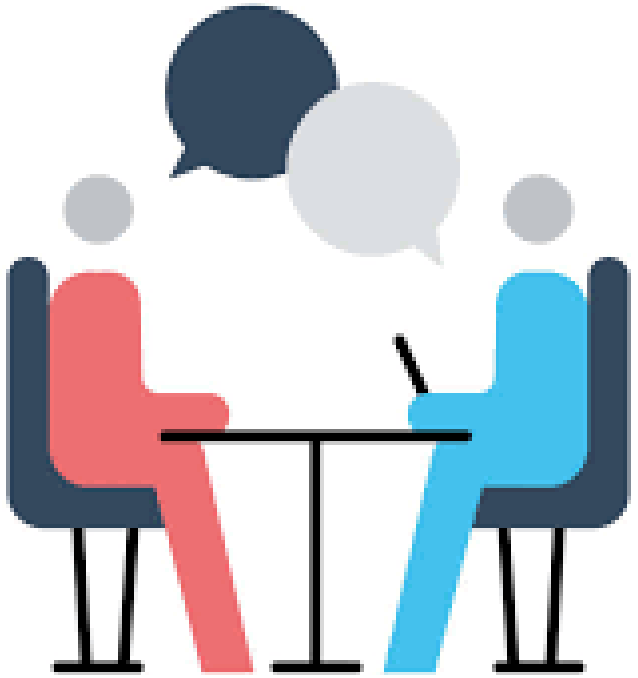


KANSAS STATE UNIVERSITY


WE NEED
YOUR HELP

Our Goals

- Identify the prevalence of AGS in KS
  - Surveys for county Extension agents - completed
  - Listening Sessions – On-going
  - Distributes surveys to community members you serve–**WE NEED YOUR HELP ON THIS**
  - Interview people with AGS – **WE NEED YOUR HELP ON THIS**
- Create posters, infographics, and a website (https://k-state.edu/ags)



The survey focuses on:

1. Previous knowledge of red meat allergy?
2. Do you know someone who has red meat allergy?
3. How has their life changed after AGS?

We will share survey information with Kansas Department of Health and Environment to help them better allocate resources to help AGS patients in rural Kansas

We are lucky enough to have resources to provide incentives ($25 Amazon gift card) for each completed survey

BUT we need your help to distribute the surveys to key locations in the communities you serve

Schools

Local clinics/hospitals

Many other places you can think of!!!

Retirement Communities

Churches

KANSAS STATE UNIVERSITY

If you have AGS and are a Kansas resident, we would like to interview you!

- **Incentive of $50 Amazon gift card**
- The interview will be in March or April
- The interview will take ~30 min
- The interview is going to be through Zoom. If you don't have internet access, we can also do phone interviews
- If you know someone (must be a Kansas resident) who has AGS, and he/she would like to be interviewed, please have them contact

Alexandra "Paige" Tegeler at:

aptegeler@ksu.edu

KANSAS STATE UNIVERSITY

Questions?

If in need of more surveys or you have further questions, please contact Alexandra "Paige" Tegeler at:

aptegeler@ksu.edu