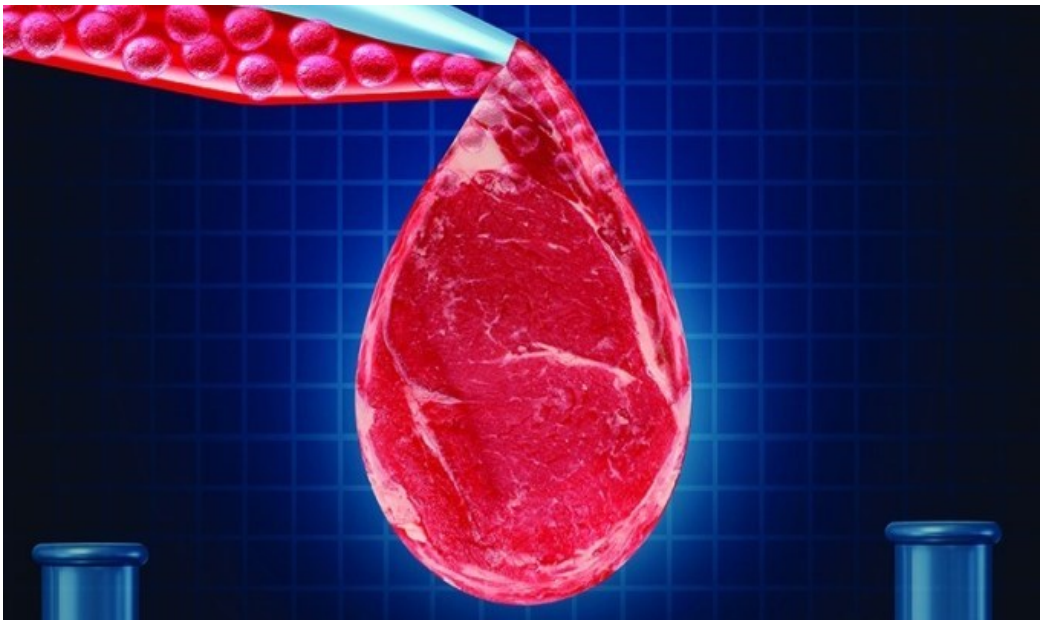
Cell Cultured Meat:



Are You In or Are You Out?

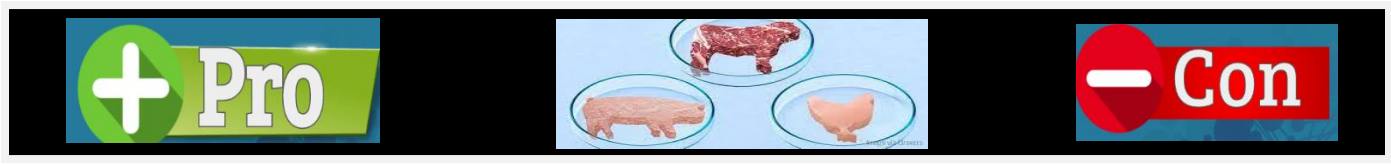
State Competition: May 15,2021

Tulare FFA CHAPTER

591 West Bardsley Ave

Tulare, CA 93274

(559) 687-7390



1. List course(s) in which instruction occurred including the number of students involved in the instruction of the issue.
Agricultural Business Management (28 students) - evaluated the financial impact of the utilization of cellular meat in agriculture. Agriculture Biology (91 students) evaluated the impact on human health as it related to the use of cellular meat and food safety standards. This research was conducted in classes just prior to the Covid outbreak in March 2020.

2. Why is this issue important now?
The argument that raising livestock is having a negative impact on our environment has become an ever-growing concern. Cell cultured meat is important now for a variety of reasons. First, it offers a way to reduce the agricultural impact on the environment as compared to that of traditional meat production. As our world population is expected to exceed 10 billion people by the year 2050, cell cultured meat may become a sustainable source of food to feed this growing population. Studies have shown that producing Cultured Beef would use 99% less space than what is needed for current livestock production. Similar studies have also shown a reduction in energy and water use when compared to traditional livestock production.

3. What is the nature of this issue?
By 2050 estimates suggest that the number of people on the planet will have increased by 2 billion and could peak by nearly 11 billion by the turn of the century. Estimates suggest by 2050 the demand for meat will grow by a staggering 70 percent, but does our taste for animal protein come at an environmental cost? Eliminating the need to breed, raise, and slaughter animals for food could be the wave of the future. Cultured meat, which is generated from only a few animal cells, could also result in ethical meat products that avoid animal welfare concerns. Numerous startups around the world are researching the mass production of cultured meat with the aim of putting affordable meat products on the consumer's plate.

4. Who is involved in the issue?
There are currently five companies at the forefront of the cultured meats revolution. They are Mosa Meats (Netherlands), Upside Foods (formally known as Memphis Meats) (California), Aleph Farms (Israel), Blue Nalu (San Diego) and Finless Farms (California). These companies claim that their products are safe, sustainable, and environmentally friendly. Lab grown meat can be produced in as few as 6 weeks thus creating a faster more accessible meat supply. Animal Rights representatives also support the cell-based meats culture terming it "slaughter free." These products have however generated many questions, concerns, and confusion among livestock producers and meat consumers. Questions of food safety, labeling and cost continue to be raised by the National Cattleman's Association, American Farm Bureau, and Livestock and Meat Industry representatives as well. In addition, a North American Meat Institute survey found that only 28% of consumers surveyed would eat a cell based meat product, 15% were undecided, and 57% claimed they would not consume this product.

5. How can this issue be defined?
The issue of cell cultured meats can be defined by one simple question: Is Cell-Based Meat the future of meats and if so, when will we be safely eating lab-grown meat? The process starts with a removal of a muscle tissue from a living cow. Scientists then feed and nurture the cells, so the cells can multiply to create muscle tissue, which is the main component of the meat we eat. It is biologically the same as the meat tissue that comes from a real cow because it was derived from a biopsy from a cow. This process generally takes 2-6 weeks to produce meat from lab to table.
We chose to examine this question by researching perspectives from the National Cattleman's Association, the Farm Bureau, Upside Foods (formally known as Memphis Meats), and the consumers concerns. Comparing these viewpoints revealed strong differences in opinion between all stakeholders. The debate on how lab grown meat will fit into today's food supply has strong concerns on both sides. Will the production of lab grown meats be an asset to agriculture offering a safe, sustainable, and environmentally sound product or will it be a detriment to production agriculture because of production costs, mis-labeling and food safety concerns due to marketing the product too quickly without adequate testing?

6. What is the historical background of the issue?

Significant dates regarding the Cellular Based Meats issue are listed below:

- 1912: French biologist Alexis Carrel demonstrated the possibility of keeping muscle tissue alive outside the body.
- 1932: Winston Churchill predicted that meats would be grown in a cell based medium.
- 1971: Russel Ross achieves in-vitro cultivation of muscular fibers.
- 1972: The USDA approves the use of commercial in-vitro meat production.
- 1999: William van Eelen secures the first patent for cultured meat.
- 2001: NASA begins in-vitro meat experiments, producing cultured turkey meats.
- 2005: The first peer-reviewed journal article on lab-grown meat appears in Tissue- Engineering.
- 2008: PETA offers a $1 million prize to the first company that can produce a lab grown chicken by 2012.
- 2011: The company Modern Meadow, aimed at producing cell cultured meat, is founded.
- 2013: The first cultured hamburger, developed by Dutch research Mark Post (founder of Mosa Meats), is taste-tested.
- 2015: The Modern Agricultural Foundation, focused on producing cultured chicken meat, is founded in Israel.
- 2016: Memphis Meats announces the creation of the first cell cultured meatball.
- 2016: New Harvest hosted New Harvest 2016: Experience Cellular Agriculture, the first-ever global conference.
- 2020: Memphis Meats receives $161 million in startup funding for its company to produce cultured meat.
- 2021: Memphis Meats changes its name to Upside Foods.

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7. What caused the issue?

"Why grow the whole cow, if we can grow meat from their stem-cells?" This is the premise of cell-based meats. The world's population is expected to exceed 10 billion people by the year 2050 and the consumers demand for meat products continues to increase. Agriculture is continually challenged to be more sustainable and with a population that is growing rapidly agriculture must find new ways to produce more with less. Cell cultured meat addresses this issue because it takes a small number of cells from an animal and uses that to produce more meat using less resources. Another contributing factor to the idea of producing cultured meat is the environmental benefits. Production of cultured meat reduces the amount of greenhouse gases significantly. The last major cause of this issue is the push to produce food in a more ethical way. Many consumers decide not to eat meat because of the killing of animals, but with cultured meat, livestock are needed to provide starter cells, there is no killing in the process of meat production.

8. What are the risks?

- Genetically modified cell lines replication
- The sterility of the product- the growing medium may increase the level of bacterial contamination of the product
- Over the long term, the environmental impact of lab-grown meat could be higher than that of livestock.
- Unclear regulatory framework nationally and internationally
- Food safety regulation concerns

9. What are the benefits?

- Reduce the use of energy by as much as 45%
- Reduce the use of land by as much as 99%
- Produce up to 96% fewer greenhouse gases
- Provide food for the world more efficiently and could reduce environmental impact
- Create food options for consumers concerns regarding animal welfare – slaughter free process

10. Is there strong disagreement on the issue?

Yes, with the labeling of products already being an issue in agriculture, cell cultured meat only maximizes this problem. Meat producers and livestock organizations have spoken out about their concerns that come with this innovation of meat. There are many questions to be answered regarding the safety of both the production and consumption of the product. They are concerned that the line between cell cultured meat and conventional meat will become blurred, confusing the consumer. Meat producers have concerns that cell cultured meat will be purposely misleading in efforts to gain support from consumers. On the opposing side, environmentalists believe that cell cultured meat is a step towards improving our environment. There is also the benefit of lab grown meat helping move toward sustainability for the growing world population.

LOCAL FORUM PRESENTATION

When	Where	To Whom	# Present
April 6, 2021	Tulare, CA	Greater Tulare Kiwanis	7
April 8, 2021	Selma, CA	Harris Ranch Board Meeting	5
April 9, 2021	Tulare, CA	Tulare Noon Rotary	23
April 13, 2021	Tulare , CA	Tulare Ag. Education Advisory Committee	11
May 5, 2021	Tulare, CA	Tulare Sunrise Rotary	20
May 5, 2021	Tulare, CA	Noon Kiwanis	18
May 5, 2021	Visalia, CA	Tulare County Farm Bureau	6
May 12, 2021	Fresno, CA	Bitwise Industries	25

Tulare Morning Kiwanis
April 6,2021 at 7:00 AM
Virtual Meeting—Zoom
Number in Attendance: 7

April 6, 2021

The Tulare FFA chapter's Ag Issues team visited our Greater Tulare Kiwanis Club this morning. The team presented their arguments addressing the topic of Cell Based Meats. The team addressed the pro and con viewpoints of this topic. Both sides were supported by factual information based on research done by the students. Afterwards time was allotted for questions from the club members. We thank the team and advisors for addressing such timely issues in agriculture and for the professionalism exhibited by the team members.

Sincerely,
Vern Bellagio

Harris Ranch Board Meeting
April 8, 2021 at 2:00 PM
Harris Ranch -Selma Facility—Board Room
Number in Attendance: 5

April 14, 2021

Tulare FFA Ag Issues Team
Attn: Jennifer Sousa
Tulare High School FFA
Tulare, CA 93274

To the members of the Tulare FFA Ag Issues team and their advisors -

We want to thank you for the presentation you provided last week (April 8th) to members of the Harris Ranch Beef Company management team. The presentation itself was conducted in a very professional manner, and the breadth of materials you covered clearly illustrated your understanding of the issue(s) surrounding cultured meat, and the technology's role in fulfilling the protein needs of a rapidly expanding human population.

Your topic is timely and of extreme interest among many within the meat industry. You clearly demonstrated your grasp of the issue at hand and offered an intelligent argument on both sides of the debate regarding this new and evolving technology.

We at Harris Ranch Beef Company wish everyone on the Tulare FFA Ag Issues Team the best of luck as you move forward in State and National competitions.

Sincerely

Michael Smith
VP Technical Services
Harris Ranch – Beef Division

Tulare Noon Rotary
April 9,2021 at 12:00 PM
Ray VanBeek's—Tulare Ranch Farms
Number in Attendance: 23

Rotary Opens Opportunities

Rotary

April 11, 2021

TO: Dave Caetano
Tulare FFA
FR: Donnette Silva Carter
President, Rotary Club of Tulare
RE: FFA Student Presentation

On behalf of the Rotary Club of Tulare, I would like to thank you for bringing the Tulare FFA students to join us for our regular meeting on April 9th. The students did an outstanding job with their Pros & Cons Presentation focused on cell-based beef development. Our 25 members in attendance were impressed with the team's research, speaking skills, critical thinking, and Q&A session.

We wish the team well in the competition and know they will make our town proud.

Tulare Ag Education Advisory Committee
April 13 , 2021 at 6:00 P.M.
Tulare Agricultural Center– Tulare CA
Number in Attendance: 11

TULARE HIGH SCHOOL AGRICULTURE DEPARTMENT
591 West Bardsley, Tulare, California 93274
Telephone: (559) 687-7390 Fax: (559) 687-7393
Email: daniel.dutto@tulare.k12.ca.us
Web Site: www.tulareffa.org

Dakota Burns · Jared Castle · Michael Mederos · Debrah Silva · Sammi Slover · Jennifer Sousa · Hector Urueta

4/14/2021

Tulare FFA Ag Issues Team
Attn: Mrs. Jennifer Sousa
Tulare High School FFA
591 W. Bardsley
Tulare, CA 93274

To the Tulare FFA Ag Issues Team:

The Tulare High School Agriculture Advisory Committee would like to thank you for your presentation on lab grown vs. natural grown beef products. The presentation was very thorough and informative, showing the amount of work the team put into developing the presentation. Your team was able to bring attention to both positive and negative effects from both viewpoints in the presentation. You were also able to handle the questions from the committee members very professionally.

Your team clearly understood the amount of controversy around the topic you chose to present as both sides of the argument were able to demonstrate their knowledge of the discussion. Also, members of the advisory congratulated the team on the presentation and how impressed they were with it.

The Tulare Ag Advisory Committee would like to wish the Tulare FFA Ag Issue Team the very best of luck in their future endeavors with this presentation.

Sincerely,

Mr. Daniel Dutto
Director of Agriculture Education
Tulare Agriculture Complex
559-687-7390
daniel.dutto@tulare.k12.ca.us

Tulare Sunrise Rotary
May 5, 2021 at 6:30 A.M.
Hazel's Kitchen—Tulare CA
Number in Attendance: 20

Rotary PEOPLE of ACTION

It is always a pleasure have Dave Caetano and the Tulare FFA Ag Issues Team present at our meeting. The membership of Tulare Sunrise Rotary always look forward to this meeting. The FFA Ag Issues Team presented at our fist in person meeting outdoors on Wednesday May, 5th at 6:45am.

Club President
Daniel J Enriquez

Tulare Sunrise Rotary PO BOX 600 Tulare, CA 93275

Chartered 10/17/1997 Rotary District 5230
Federal ID 77-0460063 Club 50550

Tulare Noon Kiwanis
May 5, 2021
Vejars– Tulare CA
Number in Attendance: 18

Kiwanis

I want to thank Tulare FFA for presenting to The Kiwanis Club of Tulare (Tulare Noon Kiwanis) on Wednesday May 5 at our weekly club meeting.

Dave Caetano brought 5 students from Tulare FFA and they did an amzaing job.

Again, thank you for your presentation.

Susan Henard

Susan Henard

Club Secretary

Tulare County Farm Bureau Staff
May 5, 2021 at 6:00 P.M.
Tulare County Farm Bureau Office
Number in Attendance: 6

TULARE COUNTY FARM BUREAU
Mission: to promote and enhance the viability of Tulare County agriculture.

May 5, 2021

Tulare Joint Union High School District Farm
FFA Program
C/O Krim Caetano, FFA Coach
591 West Bardsley Avenue
Tulare, California 93274

RE: Ag Issues Contest preparation & presentation

Dear Coach Caetano and Tulare FFA members,

Thank you for presenting your recent Ag Issues presentation on Cell Cultured Meats, your preparation and planning for this effort was excellent. I enjoyed meeting with you recently to prepare for this topic and to offer you suggestions and access to research, industry contacts, and web resources to support your planning efforts. As you have developed your presentation, it is commendable that you have reached out to the agriculture industry for assistance with this endeavor.

The Tulare County Farm Bureau staff that heard your presentation were impressed with your knowledge of the subject and encourage you to continue to streamline your presentation and fine tune your comments and goals with the assignment. As you are well aware the controversy over this issue has impacted views held by environmental groups, Farm Bureau, advocacy groups, and has many far-reaching impacts. The research that has been required to learn this topic I know has been rigorous, but you are off to a great start!

I know you have also contacted and presented to many local civic clubs, and service organizations, best wishes on your competition! Congratulations to your team in their preparation efforts!

Best wishes and good luck with your contest!

Sincerely,

PATRICIA STEVER BLATTLER
Executive Director

Bitwise Industries
May 12, 2021 at 12:00 P.M.
Virtual Meeting—Zoom
Number in Attendance: 25

BITWISE INDUSTRIES
Bitwise South Stadium
700 Van Ness Ave
Fresno, California
559-500-3305
info@bitwiseindustries.com

BITWISE INDUSTRIES
Bitwise South Stadium
700 Van Ness Ave
Fresno, California
559-500-3305
info@bitwiseindustries.com

May 18, 2021

Title: Tulare Ag Issues Forum Team - Presentation Response

To Whom It May Concern:

On May 12, 2021 twenty-five members of the Bitwise team had an opportunity to watch a presentation about cell cultured meats presented by the Tulare Ag Issues Forum Team. The Bitwise audience members were extremely impressed with the presenters professionalism, knowledge, thorough research and presentation skills. Aside from a few technical issues that the pandemic Zoom-life continues to bring, the presentation was exceptional.

Below are just a few reflective comments from unidentified audience members.

- I was impressed with how well they knew their information for both the presentation and being able to answer the questions they were asked. Problems with the slide show were a bit distracting. Other than that I thought they did an excellent job.

- Other than a couple of technical hiccups that were quickly solved, I thought the event went well. Even without the better microphone, I could still understand the students. The students had clearly done their research and knew their stuff.

- I learned a lot about lab grown meat and the presenters were all very detailed and informative. Aside from the audio issues (not that there was anything big, it just sounded like they didn't have the nice microphone.) Good job! Nothing but love and respect, I wish you luck!

- I think it was great. The only thing I would work on is more of a sales approach and engaging the audience. but very well thought out. I would suggest the angle of wanting to feed everyone, homeless, space travel food for new homes...and saving the killing of animals.

We would welcome this group back anytime, and we wish them the best of luck at the National FFA Convention in Indianapolis.

Best,

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Hitt, Kelly Jonas. Director of Food Safety and Quality - Upside Foods, Berkeley California April 8, 2021

E-mail Contacts

Blatter- Stever, Tricia. Executive Director of Tulare County Farm Bureau. pstever@tulcofb.org

Carswell, KC. Vice President of Process Development. Memphis Meats kc@memphismeats.com

Coelho, Brian. CEO-President Hanford Meats and Harris Ranch. brian.coelho@harrisranchbeef.com

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