

Science AMA Series: I’m Alison Van Eenennaam, a geneticist at University of California – Davis. I am in the documentary movie Food Evolution - narrated by Neil deGrasse Tyson that is playing in NYC this week, and I’m here today to talk about it. AMA!

VanEenennaam<sup>1</sup>andr/ScienceAMAs<sup>1</sup>

<sup>1</sup>Affiliation not available

April 17, 2023

### Abstract

I am an animal geneticist at UC Davis with a strong interest in science communication. I am in the documentary film called Food Evolution which is showing in New York City this week at Village East Cinema (<https://www.citycinemas.com/villageeast/film/food-evolution>). The film uses the debate around GMOs as a proxy for bigger questions around decision making, alternative facts, and asks why do many people make decisions with their hearts rather than their heads? The movie has reviews in Science, and the Hollywood Reporter. As someone working in agricultural science my entire career I see a lot of deceptive marketing designed to play on people’s fears, and recently a lot of misleading “absence-labeling” suggesting the absence of something that was never in the food product in the first place (e.g. gluten-free water). My own research focuses on genetic improvement of cattle, with some research focusing on using gene editing as discussed in Science Friday and illustrated in this video. I will be back at 11 am PT (2 pm ET); I look forward to your questions on genetic improvement of crops and livestock, and/or questions related to the movie Food Evolution. My twitter handle is @biobeef.

# *the* WINNOWER

---

[REDDIT](#)

## Science AMA Series: I'm Alison Van Eenennaam, a geneticist at University of California – Davis. I am in the documentary movie Food Evolution - narrated by Neil deGrasse Tyson that is playing in NYC this week, and I'm here today to talk about it. AMA!

VAN\_EENENNAAM [R/SCIENCE](#)

I am an [animal geneticist at UC Davis](#) with a strong interest in science communication. I am in the documentary film called [Food Evolution](#) which is showing in New York City this week at Village East Cinema (<https://www.citycinemas.com/villageeast/film/food-evolution>). The film uses the debate around GMOs as a proxy for bigger questions around decision making, alternative facts, and asks why do many people make decisions with their hearts rather than their heads? [The movie has reviews in Science](#), and the [Hollywood Reporter](#). As someone working in agricultural science my entire career I see a lot of deceptive marketing designed to play on people's fears, and recently a lot of misleading "absence-labeling" suggesting the absence of something that was never in the food product in the first place (e.g. gluten-free water). My own research focuses on genetic improvement of cattle, with some research focusing on using [gene editing as discussed in Science Friday](#) and [illustrated in this video](#).

I will be back at 11 am PT (2 pm ET); I look forward to your questions on genetic improvement of crops and livestock, and/or questions related to the movie Food Evolution.

My twitter handle is [@biobeef](#).

---

[READ REVIEWS](#)

[WRITE A REVIEW](#)

CORRESPONDENCE:

DATE RECEIVED:

June 29, 2017

DOI:

10.15200/winn.149866.61445

ARCHIVED:

June 28, 2017

CITATION:

Van\_Eenennaam , r/Science , Science AMA Series: I'm Alison Van Eenennaam, a geneticist at University of California – Davis. I am in the documentary movie Food Evolution - narrated by Neil deGrasse Tyson that is playing in NYC this week, and I'm here today to talk about it. AMA!, *The Winnower* 4:e149866.61445 ,

Hi and thanks for your work. As a French speaking European scientist and blogger I find it very difficult to reach out about GMOs. Whatever I say I am accused on being shrill.

From your experience with this movie, do you have advice on communicating on GMOs without being perceived as aggressive, pushy or arrogant?

[marcrr](#)

Great question and a big problem when dealing with politically charged scientific communication topics. The shill accusation is particularly irksome when all you are doing is reporting the weight of scientific evidence! Attacking the person rather than the argument is the sign of someone losing a debate. I find trying to connect with people – having a conversation to understand what their concerns are is important. Often it is not about GMOs but other aspects of agriculture such as use of herbicides, or seed patenting, or multinational corporations. Trying to tease apart the breeding method of genetic engineering from these other concerns is important. I have found just trying to understand what peoples' concerns are and where people are getting their information gives you a place to start a dialog to see if there are any points of common agreement. Of course people who have their mind made up irrespective of the data are not going to be reasoned out of an opinion that they did not reason themselves into. Be human and try not to lead with facts or shout with facts – they are convincing to

2017 , DOI:  
[10.15200/winn.149866.61445](https://doi.org/10.15200/winn.149866.61445)

© et al. This article is distributed under the terms of the [Creative Commons Attribution 4.0 International License](#), which permits unrestricted use, distribution, and redistribution in any medium, provided that the original author and source are credited.



scientists but that is not how everyone makes decisions!

Welcome and thanks for joining us on Reddit!

Why do so many myths persist about biotechnology? Is it lack of science education or is there an effort to propagate those deceptive statements for political or financial gain?

[JF Queeny](#)

Whack a mole! That what I call this GMO discussion – as soon as one myth gets addressed another one pops up. And it is true about broader agricultural issues in general. It has been a frustration of mine for 20 years. Many of these myths are propagated in one-sided movies about agriculture that are presented as a documentary but are not based on science – they are “Shockumentaries” that have little to do with actual facts – they are more fictional opinion pieces than documentaries but the audience takes the information as fact. No unlike other forms of media where there are now entire venues put together to propagate “fake news”. Somehow as the population urbanized the 1-2% of the people who grow the food we eat have become the enemy, and innovations in agriculture are eschewed even as they are tweeted about on the latest most technologically-advanced smart phone! I can't overemphasize the critical importance of innovation in agriculture – as it has such a big environmental footprint - the opportunity cost of misinformation around agriculture is huge! See my BLOG about Whole Foods moving to “Slow Growing” Chickens ostensibly in the name of welfare (no objective data to support that assertion however) and the sustainability implications <http://biobeef.faculty.ucdavis.edu/2017/02/08/are-slow-growing-chickens-better/>

One of the critiques of the film I've seen is that it will only reach the choir. Do you think that's going to be the case?

[mem\\_somerville](#)

I hope it will have broader appeal than that – it is about the importance of objective facts and basing decisions on actual rather than alternative facts. I think the movie has implications beyond GMOs- it is about the importance of using repeatable science regardless of the topic under discussion – climate change, vaccines, GMOs, evolution etc.

Also in the screenings I have attended at various venues I have had people who were agnostic to GMOs tell me they really ENJOYED watching the movie – a science documentary! So hopefully its narrative appeal, humor, and compelling stories will make it of broad appeal.

The movie is directed by LA-based academy-award nominated (The Garden) Scott Hamilton Kennedy. He skillfully combines science with narrative storytelling and interesting circumstances to engagingly advance the discourse around GMOs from the stale false dichotomy, to a more nuanced discussion about how repeatable science might be used to develop “yes/and” solutions to problems. Ultimately, many share the common goal of a safe, nutritious food supply available to all and set within environmental limits.

Are there any plans to get this movie shown in Europe, and elsewhere outside the US?

Have you considered publishing the movie freely under a [CC license](#) to reach a wider audience?

[oln](#)

This is really a question more for the movie makers and their team at

<https://www.foodevolutionmovie.com/>. There are plans for it to come to video on demand/streaming services in Fall 2017. At the website there there are links to request a screening. Also as of this morning the ability to purchase a DVD and/or T-shirt. <https://www.foodevolutionmovie.com/store/>. In term of the CC license I am not sure as I am not the "owner" of the movie. As a public university professor I want all educational material to be free for everyone including all books, journals, and movies. But apparently authors, journal managers, and movie makers all have to eat....so not sure exactly the answer - contact them at their webpage and suggest this (don't mention I thought they should make their movie free for all)!

Hi,

What is an anecdote/concept from your research or from this documentary that would be fun for me tell at a cocktail party? Thanks!

[orangeneon](#)

Well I used to milk transgenic mice using a cut off yellow pipette tip hooked to house vacuum. They have 10 teenie, tiny nipples – to use the expression coined by Wendell Schumm on a recent podcast I did on his fun show <http://www.farmruralag.com/ontario-agcast-food-evolution-alison-van-eeennaam-is-a-movie-star/> – warning he is Canadian so he has a weird accent.

Do you have an opinion on 3D-printing organs for animals? I know it's becoming a hot button issue for physicians who deal with human patients, but I'm curious if this has come up for animal geneticists or others in your field. Is 3D-printing organs for sick animals something that has come up? What's your take?

[SpokenWorder](#)

Wow not really my field - guess i am more familiar with trying to grow human organs in animals.....<https://www.wired.com/2017/01/first-human-pig-chimera-step-toward-custom-organs/> rather than 3D printing organs for sick animals. Both I think are likely to be easier said than done but not really my field as I work more in food animal production than medical or veterinary field

The White House has trumpeted its aggressive stance on rolling back regulations, but at many times, appears to be blatantly anti-science. How do you anticipate these contradictory attitudes altering the regulatory landscape surrounding genetic modification in the coming years?

[Jays\\_93](#)

That is a hard one. I have written about the proposed regulations suggesting that animals containing intended modification are drugs at my BLOG <http://biobeef.faculty.ucdavis.edu/2017/01/22/fda-seeks-public-comments-on-regulation-of-genetically-altered-animals/> Hard to guess what the current administration might do – many smarter people than me have tried such forecasts to no avail. At the end of the day regulation should allow safe innovation and be proportional to risk– that is not how the current “intentional” alteration draft guidance is worded and I think it will have a chilling effect on the use of gene editing and of course genetic engineering in livestock breeding programs.

Hello, I find myself surrounded by controversial family members and friends with regards to vegetarianism, meat consumption and the food industry.

Could you explain how much protein from various meat is a healthy amount for a human to consume, and/or how much we overconsume as a society?

[Yoayo112](#)

An excellent paper that looks at the different lenses through which people look at animal product consumption is Garnett T. Food sustainability: problems, perspectives and solutions. 2013. Proc Nutr Soc. 72:29-39 <https://www.ncbi.nlm.nih.gov/pubmed/23336559>. Garnett discusses the pros and cons of three different viewpoints

1) A production challenge viewpoint, in which case there is a need to change how food is produced by improving the unit efficiency of food production, termed here the 'production efficiency' perspective: Also called "sustainable intensification" There is a strong strand of optimism/pragmatism underlying this approach; it presents a positive vision of human ingenuity. Little attention is paid to potential negatives of overconsumption of animal products in the developed world; rather the importance of meat and dairy to consumers in the developing world is emphasized. Tends to focus on consumption patterns of urban populations

2) A consumption challenge, which requires changes to the dietary drivers that determine food production (may also include a focus on population growth) and 'demand restraint': Conviction that excessive consumption, particularly of high-impact foods such as meat and dairy products, is a leading cause of the environmental and health crises we face. Technological improvements alone will not be able to address the problems. This perspective also highlights research findings that reduced consumption of livestock products would actually benefit health. Notably, while this perspective strongly emphasizes the diet-related chronic diseases that are associated with animal products and widespread in many parts of the world (particularly cities), it focuses less on the ongoing problem of hunger and micronutrient deficiencies that still affect millions of poor people worldwide, especially in rural communities.

3) A socio-economic challenge viewpoint, considers both production and consumption and sees the problem as one of "imbalance" Many within this perspective advocate a central role for smallholders (particularly women) in farming a diverse range of indigenous crops and livestock breeds for local markets: More localized, diverse systems are seen as better able to deliver the full range of micronutrients needed for good health than global supply chains which produce and distribute a simplified range of processed, energy and fat-dense commodities. Looks beyond the nutritional role of meat and dairy to consider the role that livestock plays in the livelihoods of poor people, and the effect that this in turn has upon health It can romanticize smallholder production and many people with this perspective tend to argue for organic or "agro-ecological" approaches

Each of these three viewpoints has insights to offer, as well as weaknesses and inconsistencies. These may sometimes go unrecognized by stakeholders, who are too immersed in a particular frame to recognize its shortfalls or the merits of an alternative approach.

Hi Dr. Van Eenennaam, There is a growing amount of social science research examining the Science of Science Communication. Have you been able to use this research to improve your science communication efforts? Has this research changed your perspective of science communication?

Thank you for taking the time today.

[\\_goodnewsevery1](#)

Yes absolutely - this quote "Scientists have long believed that when the public disagreed with them on matters of policy, public ignorance was to blame..... But research shows that science literacy has only a limited connection to public attitudes. Instead, trust, emotion, social identity, and how an issue is framed matter more, putting much of the burden of effective communication on scientists and their

institutions.” from <http://www.the-scientist.com/?articles.view/articleNo/32384/title/Opinion--Scientists--Intuitive-Failures/> made me appreciate it is up to me to change my scientific communication style if I wanted to be effective.

What are the job prospects of a geneticist? I'm considering possibly pursuing an education in it and I'm wondering if you could shed some light on getting a PhD and finding a job after. Is it particularly hard in academia? Could a geneticist find a job in industry with ease? Honestly any info or insight you could share would be much appreciated

[supersomebody](#)

Plant and animal geneticists are getting snapped up by industry even as they finish their degrees! Especially those with strong quantitative genetic skills - high demand in breeding companies and also human medicine. Academia there are jobs too - depends a bit on your luck and timing as to whether a position opens up at a particular institution when you are ready for a job. I had to wait a couple of years after my PhD before my current job was advertised at UC Davis in 2001 and could not leave Davis as my husband works here and I had young babies I also love the Aggies (UC Davis) - so I got lucky. Be open to new ideas, do internships at different companies and places and keep your options open and NEVER underestimate the effect of a chance encounter or serendipity in guiding you to your eventual career.

Is and/or should the suffering of animals in food production be of any concern to the scientific community?

[noupdnvotedelpost24](#)

It sure is - there are a number of animal welfare scientists in my department working on this issue - trying to develop objective measurements of animal welfare upon which to evaluate different production systems and management practices. This information can then be used to make evidence-based decisions on how to improve food animal welfare. What does not help is when marketers arbitrarily decide what makes good welfare and then preclude certain technologies in the absence of any supporting data. Mandating that antibiotics never be used, for example, ignores the fact that animals just like us sometime get sick with a bacterial infection - what happens then if therapeutic use of antibiotics is not allowed? Tradeoffs (risks/benefits) always need to be considered when implementing or prohibiting production practices in animal agriculture.

Do we really need to improve livestock when science tells us that a vegetarian lifestyle is better for the planet and human health?

[Oh-never-mind](#)

I don't agree that "science tells us that a vegetarian lifestyle is better for the planet and human health". I think it is complicated and depends where you live and what you have available as a source of calories and micronutrients. An excellent paper that looks at the different lenses through which people look at animal product consumption is Garnett T. Food sustainability: problems, perspectives and solutions. 2013. Proc Nutr Soc. 72:29-39 <https://www.ncbi.nlm.nih.gov/pubmed/23336559>

Ofcourse livestock are not just food - they provide other services and outputs. One of the best discussions of the importance of livestock production and consumption is the excellent book by Sir Gordon Conway Conway, G. 2012. One Billion Hungry: Can we Feed the World? Cornell University Press <http://www.cornellpress.cornell.edu/book/?GCOI=80140100695530> He argues that livestock: •

Contribute 40% of global value of agricultural output • Support livelihoods and food security of almost 1 billion people • Provide food and incomes and consume non-human edible food • Contribute 15% of total food energy and 25% of dietary protein • Provide essential micronutrients (e.g. iron, calcium) that are more readily available in meat, milk, and eggs than in plant-based foods • Are a valuable asset, serving as a store of wealth, collateral for credit, and an essential safety net during times of crisis • Are central to mixed farming systems; consume agricultural waste products, help control insects and weeds, produce manure for fertilizer and waste for cooking, and provide draft power for transport • Provide employment, in some cases especially for women • Have a cultural significance as the basis for religious ceremonies

Hello fellow Aggie! What is your take on grass fed vs grain fed beef?

[Pianoplunkster](#)

Well - its complicated - depends on environmental factors and competitive advantages of location. I grew up on grass fed beef in Australia - but Australia does not have a corn belt! Can you grow enough grass to keep animals on grass all year? Do you have access to affordable feed? Grass fed beef take longer to finish which has its own environmental impacts in terms of increased methane emissions per unit product. There was an interesting article a couple of years ago in National Geographic about some of this. <http://www.nationalgeographic.com/foodfeatures/meat/> Bottom line - pros and cons with all production systems. As with most things in life.

Hi Alison, Thanks for hosting this AMA. I am generally in favour of genetic engineering and GMOs, but against the practice of patenting genes/modifying genes.

How do you see companies go about practicing ethical business decisions, while protecting their R&D investments?

[lemonbb21](#)

Patenting plant varieties is not unique to genetic engineering. The majority of plant patents are not GE varieties. Plant breeders often have some IP on their varieties as a way to obtain funds to continue their genetic improvement programs. This is complicated and not really my area of expertise. Sorry - sometimes good to admit what you don't know! one thing I will add is I am not sure what you meant by "practicing ethical business decisions" but if it is has to do with suing farmers over accidental pollen drift - that is a myth <http://www.npr.org/sections/thesalt/2012/10/18/163034053/top-five-myths-of-genetically-modified-seeds-busted>

Hi! If you are at liberty to say, what are some of the potential benefits vs potential dangers that come with genetic engineering in cattle? I believe the public idea of GMOs in general are widely misunderstood, but I am still interested in problems this type of research has when applied. Thank you!

[Bananawandia](#)

I am always at liberty to say whatever I think! That is the beauty of working at a public university. Risks and benefits are always will determined on case by case basis - depending on modification. For example our hornless gene edited cows see video here [https://youtu.be/-Qks\\_LMmodw](https://youtu.be/-Qks_LMmodw) likely have little risk as no novel DNA introduced and benefit in that there is no need for manual dehorning to protect the cow and handlers. Others applications may introduce a novel protein which would need to be evaluated for potential toxicity, allergenicity and resulting attributes of the animal. For example a friend of mine is working on disease resistance - with the hope the cattle will not be susceptible to

sleeping sickness [http://www.genomics.liv.ac.uk/tryps/Key\\_Papers/PuttingSleepingSicknessToBed.pdf](http://www.genomics.liv.ac.uk/tryps/Key_Papers/PuttingSleepingSicknessToBed.pdf)  
As with all applications need to weigh risks and benefits - and for me disease resistance has a lot of potential upside in terms of reducing animal disease by using genetics rather than chemicals to treat/control/prevent disease

Hello Alison! If I could go back to the patent issue (perhaps you have more experience with this question): We know there are lots of plant patents, both GE and not. What about animals (excluding laboratory and research animals). Are patents common in the animal world?

Bonus question (don't worry, Folta had to answer this too): Would you rather fight a cattle sized duck, or 100 duck sized cattle? (assume they are hornless :-)

#### [Pdiff](#)

Certainly there was the infamous oncomouse <http://www.smithsonianmag.com/smithsonian-institution/first-patented-animal-still-leading-way-cancer-research-180961149/> but patents rarely used in food animal breeding to my knowledge. Poultry and pigs tend to have companies that maintain their proprietary parental lines in house, extensive industries like sheep and beef cattle have breed associations and anyone can breed a bull using artificial insemination (AI) semen. Dairy has AI companies but hard to protect best bull as competitors can buy a straw of semen and now they have best bulls son or daughter! That actually is a bit of problem in terms of investment as hard to protect your improved genetics so disincentivizes investment.

I think I would choose 100 duck sized beef cattle as I think I could use their flight zone (<http://www.grandin.com/behaviour/principles/flight.zone.html>) and herding instincts to herd them into a little duck sized holding pen perhaps with the help of my sheep dog who might finally do something constructive as he is the world's worst watch dog -he only barks at visitors when they are leaving the house not when they are entering! That way I would not need to fight these lilliputian cattle. Perhaps they will be the next pet craze like purse pigs.