Twitter Trends: #CageFree, #Vegan, #AnimalRights, and More!

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Background

Examining how public engagement with animal advocacy issues changes over time is key to our understanding of our target audience, and our understanding of the issues themselves. This goal is one that Faunalytics has pursued for many years, most notably through our 12-year [Animal Tracker](#) — an annual survey of U.S. adults' attitudes and behavior related to animals and animal advocates.

[Ipsos \(2020\)](#) recently published a visualization of U.S. Google Search data showing how levels of interest in vegan and plant-based diets have changed, state by state, over the period 2004 to 2019. While it is good to see the numbers increasing, this sort of analysis is difficult to interpret without other context. Is the increase in interest on par with other, non-animal-friendly diets? Do Google Searches mean people feel positive or negative about the diets, or are they just curious about what they are?

The current analysis of a year of Twitter data provides a deeper look at the general public's interest in animal-friendly diets, as well as other issues related to animal protection and advocacy. The time frame is shorter but the inferences we can draw are stronger.

Key Findings

Please note, when we talk about *keywords* throughout this report, it refers to words that are used in hashtags or anywhere in the body of a tweet.

1. **Tweets pertaining to animal-friendly diets—especially veganism—are much more common than related concepts like animal advocacy, animal welfare, or cultured meat.** There were about 150k tweets about animal-friendly diets most weeks, versus under 30k on other topics. This may suggest that advocates wishing to reach a wider audience should include diet-related content or hashtags whenever possible.
2. **Use of diet keywords tended to spike in the first week of January, and this was particularly noticeable for 'vegan' and 'plant-based.'** The use of 'vegan' almost doubled from 105k usages in the last week of December to 193k in the first week of January. 'Plant-based' is used much less often, but had a larger relative spike: from 11k in the last week of December to almost 29k by the second week of January. The beginning of the year is a good time to be active with those diet-related keywords and hashtags!
3. **Tweets about veganism are far more frequent than any of the other related dietary keywords**, including 'vegetarian,' 'plant-based', 'reducetarian', or 'flexitarian'. This may reflect that vegans are more likely to be active advocates for diet change, or see it as a more important part of their identity, both of which have been shown in the literature. It may also reflect greater interest among the general population in engaging in conversation around veganism.

4. **Tweets about cultured meat were less frequent than other advocacy-related tweets, but they were used positively most of the time.** This is likely good news for those investigating how to market these products in the future! It is also notable that the term ‘lab meat’, while used frequently early on in the analysis period, dropped off substantially and continued to decline—this may be good news for advocates who have campaigned against the use of more clinical terms like “lab” and “in vitro”.

Data

Faunalytics’ usual practice is to publish our data for transparency and use by other researchers. In this case, the Twitter Terms of Service prevent us from publishing the data we obtained via their API. If you are a researcher interested in the data from this study, please contact the [Research Director](#).

Research Team

This project was conducted by Faunalytics volunteers Matt Montalbano and Paul Fornia under the supervision of Dr. Jo Anderson, Research Director.

Method

For this study, data was gathered from Twitter during the months of February 2019 to March 2020. Using Python and the Tweepy Python library, a script was written to access the Twitter API. Once a day during that period, the script used the Twitter API to search the previous day’s tweets for any tweets that contained any predetermined keyword, as shown in the table below. This includes keywords used in hashtags but also in the body text of a tweet.

Table 1. Animal Related Keywords

Animal-Friendly Diet Keywords	Cultured meat Keywords*	Welfare Keywords	Advocacy Keywords	Other Keywords
vegan	lab meat	cage free	animal advocacy	animal testing
vegetarian	cultured meat	free range	animal rights	cruelty free
reducetarian	cell based meat	gestation crate	animal activism	humane
flexitarian	in vitro meat	animal welfare	animal liberation	
pescatarian	artificial meat	factory farm	effective altruism	
Meatless Monday	lab grown meat	live export	animal protection	
Veganuary	slaughter free meat	intensive agriculture	effective animal advocacy	
plant based				

The tweets were grouped into categories by keyword. Each tweet category was then saved into a Python pickle file (.PKL) in increments of 10,000 tweets. It then output a ZIP file of each day's PKL files, which we cleaned and converted to CSV format.

Data cleaning entailed removing any duplicate tweets that were found by the Twitter API. The only fields that were kept for each tweet when converting from the PKL files to CSV files were screen name, text, tweet favorite count, retweet count, and date/time.

Analysis Method: Positivity and Negativity In Tweets

In addition to showing the year-long keyword trends, we also conducted a sentiment analysis, using the Vader Sentiment Analysis library ([Hutto & Gilbert, 2014](#)) in Python to compare the positivity/negativity of tweets containing similar keywords to see whether there were differences in how each keyword is typically used, which may provide insight into public perceptions of these diets and issues.

In some cases, a keyword was classified as positive or negative when run through the Vader analyzer on its own. For example, “free range” is classified as positive because the word “free” is given a positive sentiment score by Vader. Therefore, by having “free range” appear in a tweet, the tweet is skewed towards positive sentiment. In order to get rid of this bias, we hyphenated all keywords with more than one word (e.g. “free range” became “free-range”) when running the tweet through the analyzer. This removed any score that was inherent to the keyword. All keywords consisting of just one word did not have any bias, so we left them as is.

PLEASE NOTE: *Due to the nature of automated sentiment analysis, some nuance may be lost, resulting in a few positive/negative classifications that may seem counterintuitive. Specifically, it is not possible to differentiate tweets that are “positive” because they show positivity about gestation crates vs. positivity in individual words or punctuation used (e.g., “We need to free all pigs from gestation crates!”, with ‘free’ and the exclamation mark being classed as positive). The ‘gestation crate’ keyword is the primary example. It appears mostly in tweets petitioning for gestation crates to stop being used, which are classified as positive because many tweets used exclamation marks and contained the word ‘free.’*

Results

Regular Faunalytics readers are probably used to thinking about data that comes from a sample of a population, which means that we need to conduct statistical tests to see whether the differences are likely to be “real” for everyone. As you dive into these results, bear in mind that we scraped all tweets with these keywords rather than taking a sample, so no statistical testing is required—all differences shown are exactly what occurred on Twitter over the year of data collection.

A Year Of Animal Tweets: Overview

Figure 1 below shows how frequently each category of animal-related keywords were used in tweets over the course of a year: that is, total uses for each category. In subsequent sections, we provide additional information about each keyword category.

As you can see, tweets about animal-friendly diets were far more frequent than tweets about animal welfare, animal advocacy, or cultured meat. There was also a clear spike in early January, which we discuss in the section “A Year of Diet Tweets” below.

Figure 1: Animal-Related Keywords: Weekly Use By Category

A Year of Diet Tweets

Figure 2 below shows that the keyword "vegan" was used much more frequently than other animal-friendly diet keywords. Use of diet keywords tended to spike in the first week of January, and this was particularly noticeable for ‘vegan’ and ‘plant-based.’ The use of ‘vegan’ almost doubled from 105k usages in the last week of December to 193k in the first week of January.

'Plant-based' was used much less often, but had a larger relative spike: from 11k in the last week of December to almost 29k by the second week of January.

Figure 2: Animal-Related Diet Keywords: Weekly Use

As noted above, the word 'vegan' is used far more frequently than any of the other keywords, including similar words such as 'vegetarian' and 'plant-based', or reduction-related words such as 'reducetarian' or 'flexitarian'. This is an interesting reversal of dietary prevalence. By most U.S. estimates and many international ones, vegetarians are somewhat more prevalent than vegans, and people with various reduction goals are many times more prevalent than that. This may reflect the possibility that vegans are more likely to be active advocates for diet change, or see it as a more important part of their identity. It may also reflect greater interest among the general population in engaging in conversation around veganism.

Though many keywords such as ‘vegan’ and ‘vegetarian’ seem not to have increased or decreased in usage on average over the whole year, keywords such as ‘plant-based’ seem to be catching on and display a clearer upward trend in usage over the year.

Many of these diet-related keywords also show a spike in usage during the first weeks of August. This may be due to the publication of a special report on climate change and land by the Intergovernmental Panel on Climate Change on August 8th, 2019, which recommends people to decrease their intake of meat. Another spike in usage across diet-related keywords happens in the first weeks of January, likely because of New Year’s resolutions around specific diets. An example of this is the substantial increase in the usage of the keyword ‘Veganuary’, which is a non-profit organization that challenges people to try vegan for the month of January and beyond.

Positivity and Negativity in Diet Tweets

Figure 3 below breaks down tweets containing these animal-related diet keywords by the overall sentiment of the tweets. For instance, tweets containing the keyword ‘vegan’ were positive 53.8% of the time, negative 21.2% of the time, and neutral 25.1% of the time.

In general, as the figure shows, all of these animal-related diet keywords are used in a positive context more often than a neutral or negative context. However, our main goal was comparing between keywords. ‘Reducetarian,’ ‘flexitarian,’ and ‘Veganuary’ were used in positive contexts the most often, while pescatarian was used positively the least often. ‘Pescatarian’ and ‘Meatless Monday’ were used neutrally more often than other diet-related keywords. Negative usages were more common for ‘vegan,’ ‘vegetarian,’ ‘pescatarian,’ and ‘plant-based’ than for the other keywords. Put another way, when it comes to the most restrictive diets, a higher proportion of tweets were negative compared to less restrictive diets and challenges. Veganuary is a particularly interesting example, in that it had many positive and few negative usages compared to other keywords, despite its emphasis on veganism.

Comparing two commonly interchanged and debated terms, ‘plant-based’ was used positively more often than ‘vegan’, and was used negatively less often. However, as noted in Figure 1, ‘vegan’ was used far more often than plant-based overall.

Figure 3: Animal-Related Diet Keywords: Sentiment Analysis

Examples

- **Positive:** "We like to support are [sic] vegan family, this man is a true vegan, We would like to say a massive well done Lee wood #vegan #veganuk #veganlifestyle #veganlowcarb #veganworld #veganinspiration #veganrunners <https://t.co/ajOyVL6lAh>"
- **Neutral:** "@ShariqShamimMD Plant based keto?"
- **Negative:** "You holier-than-thou vegan bitches really be pissing me off."

Vegan Vs. Other Diets

Figure 4 below shows the keyword 'vegan'—the most-used keyword from Figure 1—in comparison with a range of other diet keywords that are *not* related to animal protection. Many of these represent various fad diets (e.g., keto, Paleo) or health concerns (e.g., gluten free, weight loss). This provides a comparison between diets of relevance to animal advocates and those that are not, to see whether similar trends apply.

Figure 4: Diet Keywords: Weekly Use

Diet-related keywords in this graph, such as 'keto', 'weight loss', and 'clean eating' see a spike in usage in the first weeks of January, similar to the diet-related keywords in Figure 1. Certain diet-related keywords in this graph, such as 'keto', 'Paleo', and 'GMO', see a slight downward trend in usage over the year of collected data, perhaps suggesting waning popularity of these fad diets. The keyword 'vegan' is used more frequently than any of the non-animal-relevant keywords, perhaps because it is used for social influence more than the others.

Positivity and Negativity in Vegan Vs. Other Diet Keywords

Figure 5 below shows tweets containing other diet-related keywords broken down by sentiment and compared with sentiments for the keyword 'vegan'. Here too, the goal is comparison of trends: are non-animal-relevant diet keywords used in similar contexts to 'vegan'?

Overall, the answer is yes. When compared to other diet-related keywords, the keyword 'vegan' is used in similar proportions in positive, neutral, and negative contexts. 'Vegan' compares the most very closely to the keyword 'keto' in terms of sentiment. Other diet-related keywords, such as 'non-GMO', 'organic', 'Mediterranean diet', and 'Paleo' are used positively slightly more often than 'vegan'.

Figure 5: Vegan Vs. Other Diet Keywords: Sentiment Analysis

Examples

- **Positive:** "Thank you @marksandspencer for a fantastic range of lovely, good quality and affordable vegan friendly shoes & boots."
- **Neutral:** "Right next to the people that think BPA free, organic, gluten free, and non GMO means vegan."
- **Negative:** "Factory farms are terrible for our health, the environment, and animal welfare. GMO animals could make the whole system even worse: <https://t.co/lptvPkQm6M>"

A Year of Welfare Tweets

Figure 6 below shows that the keyword 'humane' was the most common of the animal welfare-related words, with 'animal welfare' coming in second. The more specific keywords, such as 'cage-free' or 'gestation crates' were used less often. Although there was variation in the use of all these keywords over the course of the year, no clear pattern was evident.

Figure 6: Animal Welfare Keywords: Weekly Use

Positivity and Negativity In Welfare Tweets

Figure 7 below shows tweets containing animal welfare keywords broken down by the overall sentiment of the tweets. As you can see in the graph, these keywords were split in terms of positivity or negativity of usage, with relatively few neutral tweets among them.

The keywords 'cage-free', 'free-range', 'animal welfare', and 'cruelty free' were used positively more often than the other keywords, and used negatively less often. However, 'animal welfare' was used negatively more often than the other two keywords.

Other welfare keywords, such as 'gestation crate', 'factory farm', 'intensive agriculture', and 'live export' were more closely associated with negative sentiment, rather than neutral or positive sentiment. These four keywords had the highest proportion of negative sentiment when compared to almost every other keyword across all graphs. This suggests that these keywords are likely used most often when talking about the horrors of how farmed animals are treated.

Figure 7: Welfare Keywords: Sentiment Analysis

Examples

- **Positive:** "RT @BornFreeUSA Great news! @CAGovernor @GavinNewsom has signed bills into law banning #fur sales and the use of #animals in the #circus in #California! RT to thank the governor for supporting these compassionate bills & ensuring CA is the nation's #AnimalWelfare leader. <https://t.co/8ljDTKbkJg>"
- **Neutral:** "Sign @safenewzealand's petition to end live export: <https://t.co/7McmZEIKra>"
- **Negative:** "Shockingly badger hair is still used for makeup brushes, shaving brushes and paint brushes such a cruel and unnecessary practice. #AnimalRights #AnimalWelfare #PETA @peta @PETAUK <https://t.co/qMJrxRfOh2>"

A Year of Advocacy Tweets

Figure 8 below shows that 'animal rights' is the most-used keyword within the advocacy category. This is similar to 'vegan' within the diet category, suggesting again that people endorsing the strongest pro-animal viewpoint may be most likely to take to Twitter about it. There is also a clear spike in the use of 'animal rights' in January.

Figure 8: Advocacy Keywords: Weekly Use

Positivity And Negativity in Advocacy Tweets

Figure 9 below shows tweets containing advocacy keywords broken down by sentiment. The keyword 'animal rights' was evenly split, being used in negative and positive contexts at a very similar rate.

On the other hand, 'effective animal advocacy' stood out as the keyword most often associated with positive sentiment. However, as seen in Figure 8, 'effective animal advocacy' is an extremely rarely used term with under 20 uses per week and with some weeks even having 0 uses.

Figure 9: Advocacy Keywords: Sentiment Analysis

Examples

- **Positive:** "*@allanimalrights Thank you for fighting for animal rights. I appreciate you*"
- **Neutral:** "*Peanut Butter Chocolate Banana Muffins - 1 Bowl / Blender - Vegan Richa <https://t.co/Uv2tvfUxJS> #Vegan #GoCrueltyFree #GoVegan #DitchDairy #EatPlantBased #VeganDiet #HealthyVeganDiet #AnimalRights #StopAnimalCruelty*"
- **Negative:** "*RT @VeganPoet #WorldFoodDay ~ Animals ARE NOT FOOD! When you eat meat, you're eating a rotting corpse of a tortured animal. Please see that it's NOT food! Milk is sustenance for calves; not humans. Simple to see. Animals are friends, feeling, fellow sentient beings. #GoVegan #AnimalRights <https://t.co/z91VhoygYf>*"

A Year of Cultured Meat Tweets

Figure 10 below shows that there was no clear frontrunner among the keywords included in this category. It is notable that the term 'lab meat', while used frequently early on, dropped off substantially and continued to decline over the course of data collection. This may be good news for advocates who have campaigned against the use of more clinical terms like "lab" and "in vitro". Unfortunately, due to a programming error, the keyword 'clean meat' was not included in the dataset.

Figure 10: Cultured Meat Keywords: Weekly Use

Positivity And Negativity In Cultured Meat Tweets

Figure 11 below shows what percentage of tweets containing cultured meat keywords is classified with negative, neutral, or positive sentiment.

Generally, all of the cultured meat keywords are used more frequently in positive contexts than in neutral or negative contexts. When comparing the top three keywords most closely associated with positive sentiment ('artificial meat', 'cell-based meat', and 'in vitro meat'), 'artificial meat' is used slightly more often in positive contexts than the other two keywords, but 'in vitro meat' and 'cell-based meat' are used negatively less often than 'artificial meat'. However, all the keywords were used in relatively infrequent numbers, as seen in Figure 9. For the most part, all the keywords stayed under 200 hits per week, so it would be hard to reach a definite conclusion on which sentiments the general public associate with each keyword.

When 'meat' keywords were associated with a lab, as in 'lab meat' or 'lab grown meat', it appeared to be more controversial, with a larger proportion of negative usages than for other keywords.

Figure 11: Cultured Meat Keywords: Sentiment Analysis

Examples

- **Positive:** *"RT @FutureMeat1 Excited about our new \$14m raise! Getting ready to take production to the next level. Check out this story on @CNBC Lab-grown meat start-up raises \$14 million to build production plant <https://t.co/gGp2IQsJai> #foodtech #culturedmeat #innovation #seriesA"*
- **Neutral:** *"ICYMI our news got some attention in Israel too #foodtech #culturedmeat Israeli start-up to build world's first lab-grown meat production facility <https://t.co/hSuP1jAxNz>"*
- **Negative:** *"Lab grown meat will not be readily accepted by the body and will cause the same damage as GMOs. Ya all are freakin evil <https://t.co/rwjlWFq1fk>"*

Conclusion

Given the data we collected, we were able to analyze trends on Twitter over a year, as well as analyze sentiment in these tweets to gain a better understanding of how the general Twitter population uses the keywords we chose. Although we have chosen to conduct just a few analyses here, we hope that this huge dataset will also be of use to other advocates who wish to examine how the conversation around animal advocacy issues changes over time.