Alternative Proteins: an Overview of European Online News

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European Commission

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Table of contents

Key Findings

The purpose of this document is to illustrate, using text mining techniques, what topics related to alternative proteins as a substitute to animal-derived protein consumption are covered by European online media. The report aims at providing an overview of the most important news titles and reporting trends related to this topic. The sources of our analysis include a selection of the most important online mainstream media outlets in the 27 EU Member States.

This report summarises the findings of the analysis on data collected from 1 January 2023 till 28 September 2024 and provides an overview of the reporting trends from the beginning of 2020.

Key findings:

- The share of online news on alternative proteins (1,678 articles) in the total European online media volume is relatively small, except for countries like Italy, Spain and France where food-related issues gained increased relevance in national media.
- The most prominent topic is linked to **Italy's** Synthetic Meat Ban that sparked debate and opposition from political groups and the EU. Another major topic is the approval of laboratory-grown meat sales in the UK and USA, marking a significant milestone in the development of cultured meat technology.
- The overall predominant sentiment is neutral (48%). Nonetheless, there are more articles with a positive sentiment (429 items, 29%) than articles with a negative sentiment connotation (376 items, 22%).
- The main reporting country is Italy, due to the debate around the Synthetic Meat Ban, while Latvia and Cyprus reported the least on alternative proteins.

Introduction

This science media intelligence report is part of the joint publications series of the European Science-Media Hub (ESMH) and the JRC Text Mining and Analysis Competence Centre (TMA-CC) that cover a wide range of scientific topics relevant to the work of the European Parliament's Panel for the Future of Science and Technology (STOA). This report focuses on alternative proteins as a substitute for animal-based protein consumption.

The EU's interest in achieving its health and sustainability goals has also extended to the way food is produced and consumed. The current food system in particular requires revision as its impact spreads beyond poor diet quality to include environmental consequences.[1] The necessity to address these issues has underscored the need to shift towards more plant-based food sources, with a limited consumption of red meat, processed meat, and animal-based products. This has led to an increasing interest in alternative proteins and their potential to enhance food security while minimising the environmental footprint of food and feed production.

The European Parliament's study on alternative proteins[2] has discussed the current status and future outlook of protein supply and demand, warning about the environmental impact of the increased demand for conventional proteins by 2050. With the challenges posed by climate change, it becomes essential to explore unconventional scenarios such as the role alternative protein sources could play in meeting EU protein needs. The EP study focuses on four sources of potential alternatives to conventional animal-based proteins: *algae, insects, microbially fermented products, and cultured meat*. The study assessed that these Alternative Proteins exhibit specific characteristics based on their energy requirements, environmental impacts, nutritional profiles, and potential to serve as substitutes in EU food and feed systems. Furthermore, some alternative proteins production methods still face development and technological challenges that hinder their commercial readiness or industrial scalability within the EU. The EU regulatory framework further impedes the advancement of this sector, while public opinion remains polarised in its support.

In light of the growing interest in alternative proteins, the purpose of this report is to monitor how online mainstream media have discussed alternative proteins as substitutes for animal-based proteins, including the opportunities they offer and the concerns they raise.
The in-depth analysis was performed on online articles published by mainstream European media between 1 January 2023 and 28 September 2024. An overview of the reporting trends as of 2020 is also included.

To identify the most relevant topics, an automated topic clustering algorithm was used to unveil the main events and narratives appearing in the media. The data was collected by the Europe Media Monitor engine (EMM, see Annexes) on a selection of the most important online media sources in the 27 EU Member States.[3]

[1] European Commission, Directorate-General for Research and Innovation, Group of Chief Scientific Advisors (2023). Towards sustainable food consumption: promoting healthy, affordable and sustainable food consumption choices, Brussels: Publications Office of the European Union.
[2] European Parliament: Directorate-General for Parliamentary Research Services, Smith, E., Etienne, J. and Montanari, F., *Alternative protein sources for food and feed*, European Parliament, 2024, https://data.europa.eu/doi/10.2861/999488
[3] The number of sources was weighted based on the countries' population.

Additionally, disinformation narratives have also been analysed based on news published by unverified sources during the same period (01 January 2023 to 28 September 2024) and which have been identified by independent fact-checkers as potential spreaders of disinformation in the EU.

For a more specific description of the methodology and applied technology, see the Annexes.

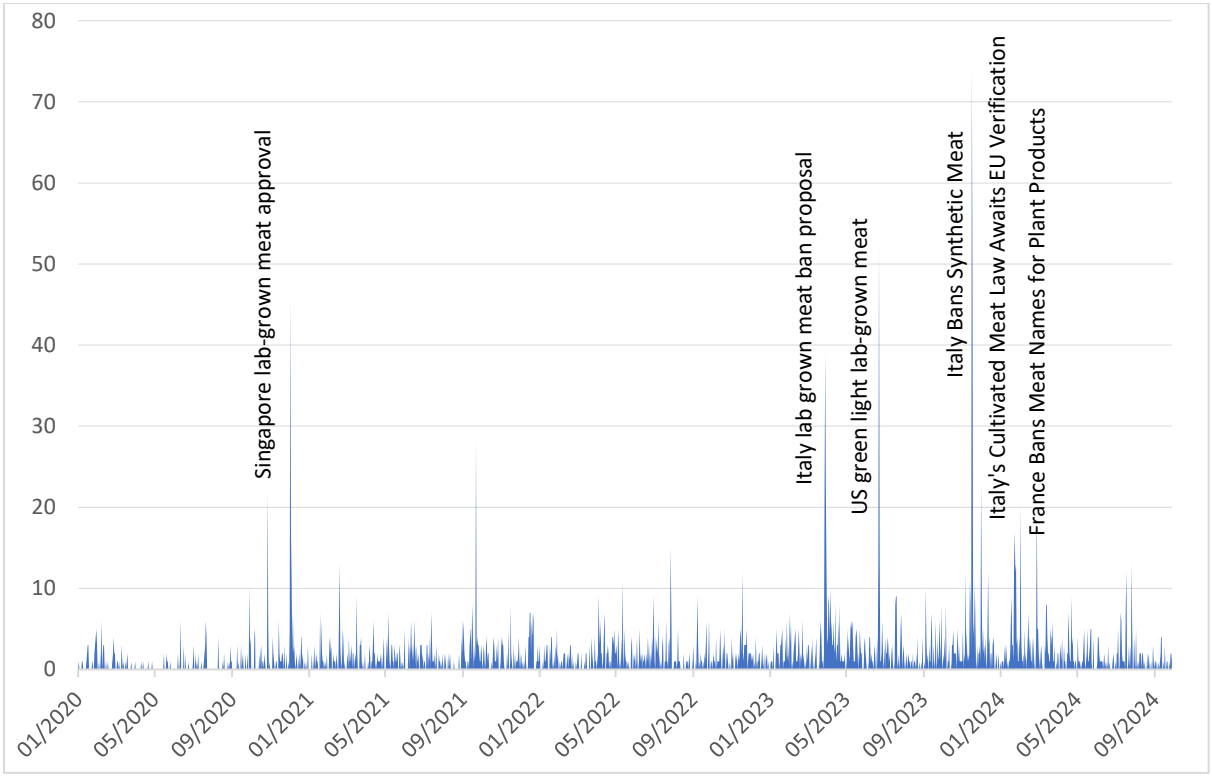
1. Overview of reporting on alternative proteins

This chapter provides an overview of media reporting on alternative proteins as an alternative for animal-based protein, emphasising their capacity to improve food security and mitigate the environmental impacts of food and feed production.

Figure 1 displays the full dataset that discusses alternative proteins as a substitute for animal-based proteins from January 2020 until September 2024. It presents the total number of articles published per day containing the keywords related to the concept of alternative proteins in the title or article's text (see Query in the Appendix). The figure also illustrates that most of the significant peaks, defined as days with over 20 articles published, occurred from 2023 onwards suggesting a growing interest in the subject by mainstream online media outlets.

As said above, the analysis focused on the period from 1 January 2023 to 28 September 2024 containing 1678 articles. Despite the low daily reporting volume throughout 2023, typically not exceeding 10 articles per day, three major peaks were observed: on 29 March, 22 June, and 16–17 November. All four peaks have recorded more than 30 articles, with the highest peak of 70 articles on 16-17 November. Conversely, a few minor reporting peaks were witnessed in 2024 (with 20 or less articles), while the daily average remained below 10 articles.

Figure 1 Reporting volume on Alternative Proteins over time for the period 2020-2024 (total volume)



Source: *EMM "EE24campaign"* index. Period: 2020-01-01 to 2024-09-28. Daily aggregated data.

The topic received extremely limited media attention compared to the overall news volume of European online media (based on the selected sources, see Annexes). Only 0.0061% of the total articles were related to alternative proteins. To put it another way, for every 16,427 online media

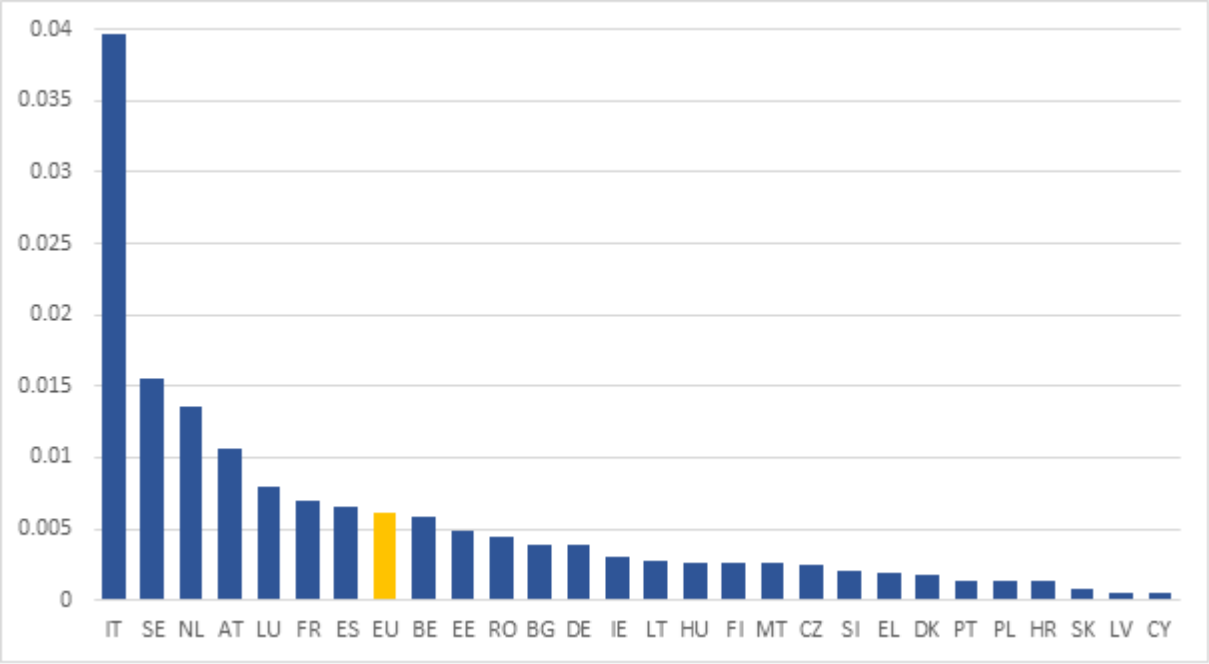
articles, only a single media article addressed alternative proteins across the whole period. Even in November 2023, the month with the biggest reporting volume with 221 items related to alternative proteins, only 0.0117% of the total online media news related to alternative proteins.

Overall, the media interest in alternative proteins remained consistently low, despite some major peaks mainly driven by announcements such as **Italy's** ban of lab-grown meat and the US and UK**'s** approval of it, which have captured media attention. Nevertheless, when comparing the reporting volume on alternative proteins from 2020 onwards, there has been a noticeable surge in media coverage as of 2023 onwards.

Figure 2 below allows to compare the media attention on alternative proteins with the global reporting of the sources selection across all 27 EU Member States during the whole time period. The figure shows that Italy has the highest share (0.04%) of media coverage on alternative proteins, which corresponds to the topic being featured in 4 out of every 10 000 articles published by the analysed European media outlets. Despite this low percentage, Italian coverage markedly surpasses that of Sweden (0.02%) and the Netherlands (0.01%), which hold the second and third biggest shares, respectively.

In contrast, Slovakia, Latvia and Cyprus recorded less than 8 articles related to this topic among 1 000 000 news items, showing little media interest and discussion surrounding alternative proteins.

Figure 2 Share of reporting on Alternative Proteins in the global European online news per Member States

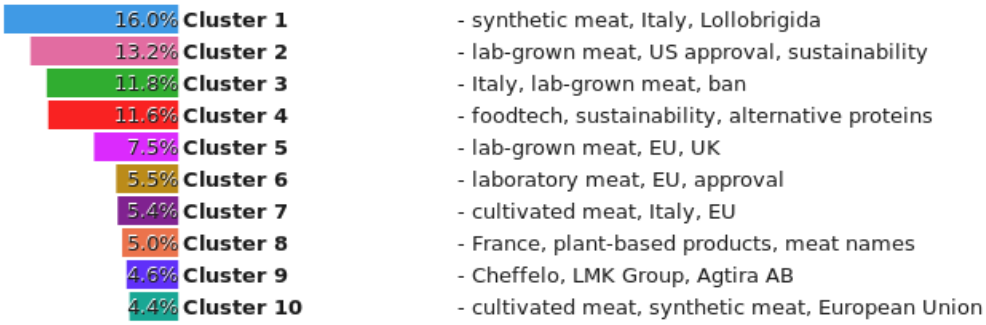


Source: *EMM "EE24campaign"* index. Period: 2023-01-01 to 2023-07-25. Aggregated data by country in percentage.

2. TOP10 topics related to alternative proteins

The main topics have been identified by grouping the articles based on their titles' semantic similarity.[4] This allows to highlight robust debates on a topic in the media and to analyse them from various angles, and to identify topics that were relevant over a few weeks rather than peaking on specific dates only (and that might therefore not stand out as peaks in the timeline). The identified topics are displayed in Figure 3 from biggest to smallest volume of articles.

Figure 3 Relative volume and most frequent keywords for TOP10 reporting topics on 'Alternative Proteins'



Source: *EMM* index. Period: 2023-01-01 to 2024-09-28.
Note: Clustering was performed on headlines. Headlines not similar to any of the groups are not considered in the distribution across topics (Clustered: 688, Total: 1,265). Similarity includes also the similar length of titles and mentions of names.

Overall, the keyword list unveils that a large share of the articles included in the dataset focusses on the environmental impact of lab-grown meat using animal cells, portraying it as a sustainable alternative to traditional farming methods. In addition, keywords referring to political actors and decisions highlight the discourse on policies playing an important role in regulating the use of alternative proteins and their effects on the conventional food industry.

The news clusters can be grouped into three main themes:

1) The biggest news group (clusters 1, 3, 7 and 8 accounting for 38.2% of the clustered articles) revolves around the Member States opposing or even banning production and sale of lab-grown meat and the reactions to it. The Italian government has enacted a law prohibiting the production and sale of cultivated meat, with Minister of Agriculture Francesco Lollobrigida justifying the move as necessary to safeguard health and environment. The law has drawn criticism from opposition parties and industry groups, and the EU rejected the legislation. Nevertheless, Lollobrigida insists that Italy is at the forefront of the fight against synthetic food and that the Italian Parliament is firmly opposed to lab-grown meat, banning its production and trade to protect national food traditions. This decision, heavily influenced by the agricultural lobby, has sparked conflict with the EU and generated both support and opposition within the country.

   In its attempt to protect traditional meat producers, the French government conducted instead an etymological war against the use of meat-related terms such as 'steak' and 'escalope' for plant-based products, sparking debates and legal challenges from companies

[4] 1,040 articles could be grouped to clusters based on semantic similarity (equal to 61.97% of the full dataset, represented by 1,678 single articles). The computed clusters provide a comprehensive overview of the main topics discussed in the context of Alternative Proteins as a substitute for animal-based proteins.

manufacturing plant-based food that claim this ban would cause harm to their business. The ban is intended to prevent consumer confusion, but some argue it will unfairly disadvantage French companies compared to their international competitors. The Council of State has suspended a decree prohibiting the use of the term "vegetable steak", and some companies are seeking to have the ban overturned.

2) The second most recurring theme (clusters 2 and 4 — accounting for 24.8%) relates to the US and UK's approval to sell lab-grown meat, marking a significant milestone in the food industry (22 June 2023). While the initial focus is on pet food, the approval paves the way for future human consumption. With the approval of lab-grown meat sales, the US and the UK became the second and third country to authorise such products after Singapore. However, online media reported on how some concerns remain about its environmental impact. Although meat produced by using animal cells is considered a sustainable alternative to traditional farming methods, challenges persist such as the high energy consumption to produce lab-grown meat and the need for more efficient production methods.

   Nonetheless, the food-tech industry is experiencing significant growth and innovation, with many startups and established companies working towards a more sustainable food future. Companies like SweGreen, Meatable, and Heura make strides in sustainability and alternative proteins. Investments in the sector are on the rise, with Eatable Adventures launching a EUR 30 million investment vehicle and FoodSeed accelerator providing EUR 15 million for food startups.

3) The third main group of news (clusters 5, 6, and 10 — accounting for 17.4%) concerns the increasing polarisation across the EU regarding alternative proteins. The concept has sparked controversy: some argue that banning alternative proteins is a mistake, while others view them as a gross deception. European countries such as the Czech Republic and Spain have shown interest in cultivated meat, while countries such Italy and France are considering laws to regulate synthetic meat, partly due to opposition from farmers and concerns about its impact on traditional food production and cultural heritage.

   Meanwhile, the EU has not granted approval for the sale of cultured meat and the European Commission has received its first request to market it. Several companies, including a French startup, are indeed seeking approval for its trade.

   A recent survey showed that almost two-thirds of Austrians are in favour of approving safe laboratory meat. However, farmers and butchers in regions like Styria and Carinthia have launched petitions against it. Austrian Minister of Agriculture Norbert Totschnig called for a debate on the topic, while the Carinthian Chamber of Agriculture initiated a petition against the use of lab-grown meat.

   The technology to produce laboratory meat is advancing, for example with new ways to use insects to produce vaccines and lab meat. Some are advocating in favour of the technology's potential to reduce animal suffering, while others express concerns about its safety and impact on traditional farming. Despite the resistance, cultivated meat is slowly making its way towards European supermarkets with some companies already launching their products. The debate surrounding cultivated meat is ongoing, with some hailing it as a revolutionary food source and others remaining sceptical.

Online media news also covered the technological advancement in cultivated meat, synthetic meat and 3D printed meat:

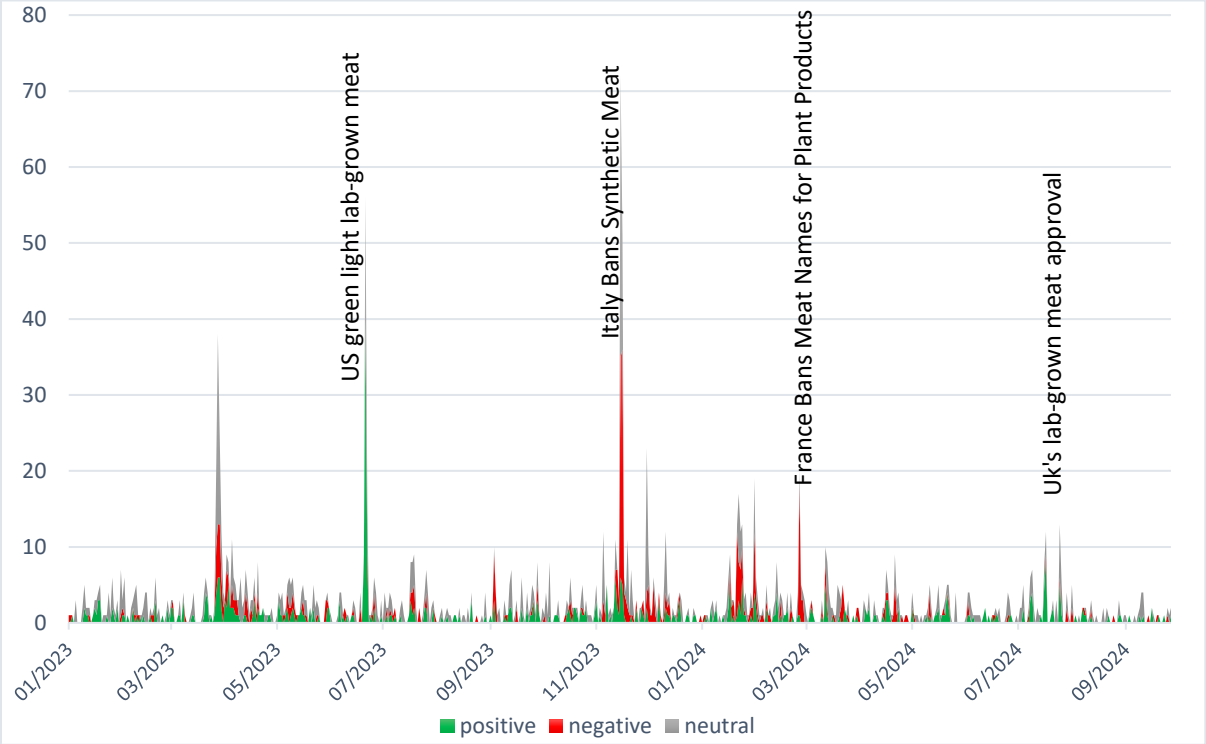
- The lab-grown meat using DNA from extinct animals (cluster 13– accounting for 3.3%): scientists have successfully created mammoth meatballs using DNA from the extinct animal and showcased them in a museum. This development has stirred interest in prehistoric meat and could lead to more innovative food products
- Advancement in 3D printing technologies (cluster 12 – 3.4%) showcases the progress of both 3D printing and lab-grown meat within the food industry. These innovations present new, potentially more sustainable options for consumers but they continue to face challenges related to public perception and environmental viability. In Germany, acceptance of 3D-printed meat is increasing, with one in five Germans being open to try it, although the majority remains sceptical. 3D-printed meat is considered an eco-friendly solution, reducing land and water use while lowering greenhouse gas emissions.
- The Israeli company Redefine Meat has been at the forefront of this innovation, developing plant-based products that replicate the structure and juiciness of traditional meat, using ingredients like soy, chickpeas and beet juice. Another Israeli company has made a breakthrough by creating the world's first 3D-printed fish meat, further expanding the possibilities of lab-grown alternatives.
- In Europe, the introduction of 3D-printed fish and meat products in restaurants and supermarkets is gaining momentum, with vegan salmon and other alternatives making their debut. Despite the promise of these innovations, challenges remain in terms of public acceptance, regulatory approval, and environmental impact.

3. Reporting tone for TOP10 topics

In addition to the content analysis, algorithms were applied for sentiment classification as well as detection of persons, rhetorical techniques, framings and human basic values (according to Schwartz, see Annex 1). Figure 5 presents them, as well as the overall sentiment, in different pie charts.

The overall sentiment detected for the news items is neutral with a share of 45.7% neutrally-toned articles, followed by 29.7% positive articles and 24.7% identified as negative items. This highlights the polarised discourse on alternative proteins across the EU, although the predominantly neutral tone of the articles is evident, as most fail to adopt a clear positive or negative stance. This is largely due to the neutral tone adopted by online media in communicating the benefits and opportunities of alternative proteins to the public.

Figure 4 Sentiment comparison over time



Source: *EMM "EE24campaign"* index. Period: 2020-01-01 to 2024-09-28

Between 1 January 2023 and 28 September 2024, the most mentioned person in the debate surrounding alternative proteins is Francesco Lollobrigida, who introduced Italy's ban on lab-grown meat during his term as Italian Minister of Agriculture. He is followed by the Italian Prime Minister, Giorgia Meloni, who led the right-wing government's opposition to lab-grown meat and continuously defended national food sovereignty as a fundamental aspect of the nation-state's identity of Italy.

Regarding human basic values that refer to desirable goals that motivate action, the expression of "Universalism, Self Direction and Security" scored the highest.

The prominence of *Universalism* (25.9%) as the top value reflects the commitment to equality and justice, and the concern for the well-being of all. This aligns with the common narratives around sustainability, environmental protection and ethical considerations in discussions around alternative proteins. *Self-direction* (17.1%) suggests that the discourse highlights the need for autonomy and the freedom to choose innovative solutions, often tied to new technologies or personal lifestyle choices. *Security*, the next most prevalent value (16.5%), underscores concern about food safety, health and societal concerns, which are key issues raised by both opposition and promoters of innovative food such as alternative proteins.

Lastly, the value *Achievement* points to the focus on innovation and success within the sector, reflecting societal aspirations for advancements in food production and resource management.

Universalism, *Security* and *Self-Direction* are the main values embedded into the biggest news group dealing with Italy's ban of synthetic meat. *Universalism* ranks on top with 26.8%. The other two topics that registered the highest score in *Universalism* are linked to the EU warnings that a ban on cultivated

meat may violate EU rules and French's government ban on the use of meat-related terms for plant products.[5]

Universalism ranked highly in clusters 1 and 2 primarily due to the perceived unfairness of banning technologies like lab-grown meat, which some advocate as being scientifically sound. The opposition to this ban emanates from concerns about equality and justice, which are at the core of the *Universalism* value. The argument against the ban being based on scientific evidence further highlights the universal desire for fairness and progress for all societies, along with the EU infringement risks and potential EU rule violations.

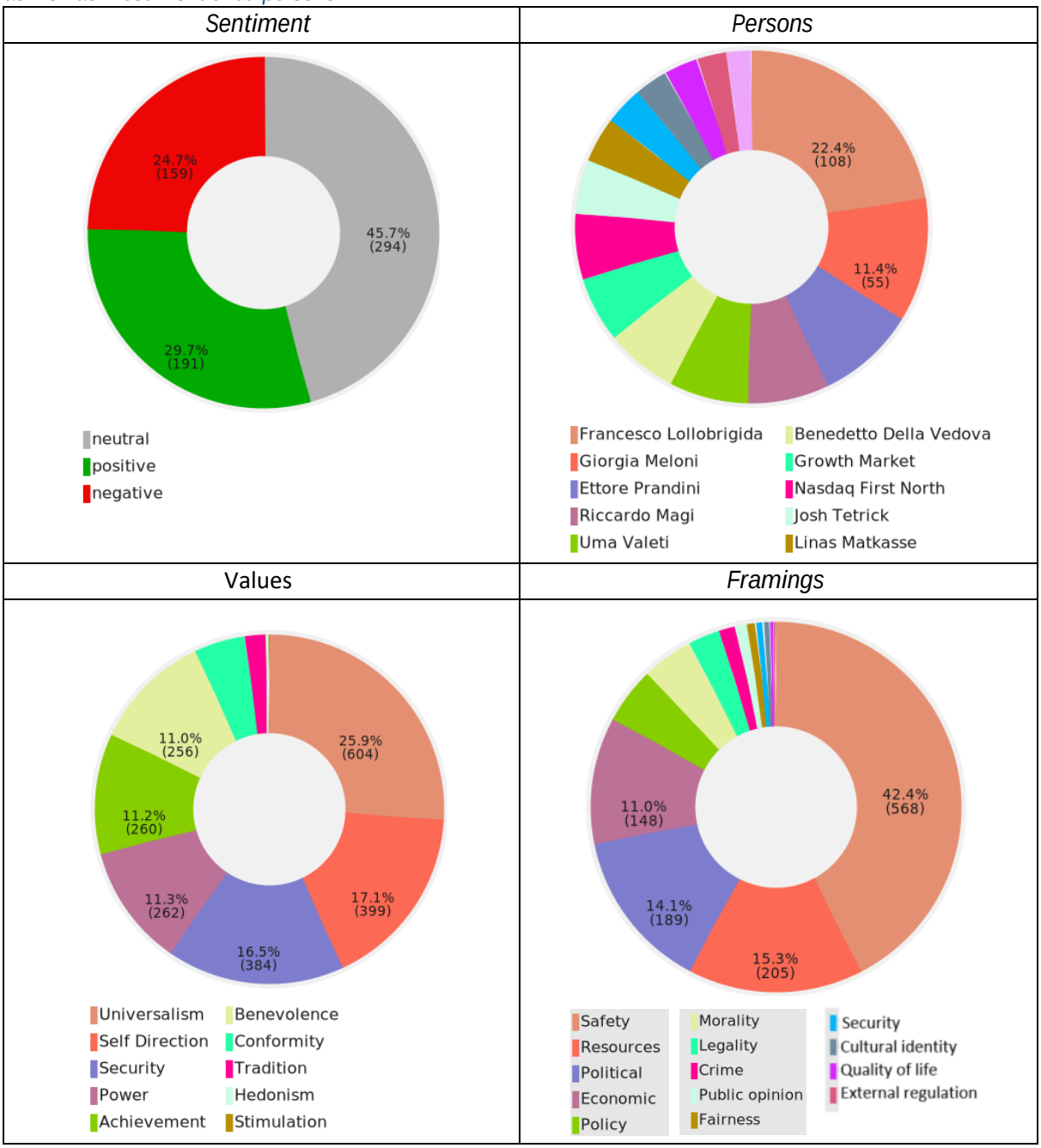
Similarly, the ban on using meat-related terms for plant-based products (cluster 8) also touches upon equality and fairness for companies trying to innovate in the plant protein sector. The French startups' opposition highlights how the decision might unfairly disadvantage them compared to international competitors. The debate around 'consumer clarity versus business competitiveness' shows a concern for justice and fair opportunities, underscoring the *Universalism* value as in 'protecting businesses and innovation on equal grounds'.

Negative sentiments score high in cluster 1 (42.1%) but also in clusters 3 (47.2%) and 8 (86.8%), reflecting dissatisfaction with the Italian and French government's decision to ban lab-grown meat or banning the use of meat-related terms for non-animal based products, seen as unfair or detrimental to business competition.

Regarding framing techniques, which refers to the perspective under which an issue or a piece of news is presented, *Safety* (42.4%) and *Resources* (11.4%) scored the highest. This reflects how articles surrounding alternative proteins are often presented through perspectives emphasizing safety and resource availability. In line with the *Security* value, it underlines the public's need for trust and reassurance when it comes to food emerging technologies.

[5] Cluster 7 scores 33.3% for *Universalism*; Cluster 8 scores 38.8% for *Universalism.*

Figure 5 Reporting tonality for TOP10 clusters, including sentiment, values, framings and rhetorical techniques as well as most mentioned persons



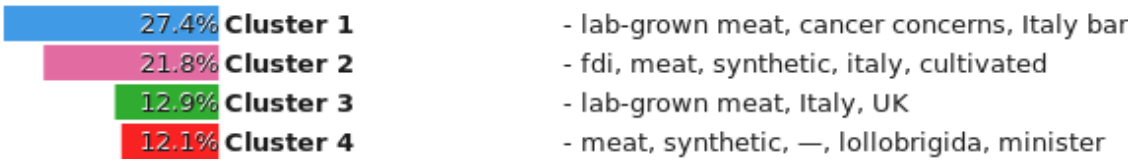
4. Disinformation narratives about alternative proteins

The topic of alternative proteins was explicitly mentioned in the title or text of 461 disinfo articles. The articles identified as misinformation and disinformation focused on two main aspects: promoting false narratives and mispresenting the arguments of those opposing the ban on lab-grown meat; and framing the support for the ban as a necessary measure to safeguard public health, often without scientifically accurate evidence.

Main disinformation narrative: Lab-Grown Meat Banned Due to Cancer Concerns

It has been widely reported that several countries and states are enacting bans on lab-grown meat due to significant health concerns, including the potential risk of cancer. Italy recently became the first country to ban what is referred to as “Bill Gates' fake meat" citing these health concerns. Articles refers to studies that suggest a correlation between the increased risk of cancer and the use of immortalised cell lines in lab-grown meat. Additionally, some sources have claimed a connection between these products and so-called "turbo cancer" in humans. Nevertheless, some companies continue to invest in lab-grown meat and insect-based foods, and the USDA has approved the sale of lab-grown meat products (cluster 1).

Figure 6 Volume and most frequent keywords for TOP4 reporting topics on “Alternative Proteins”



Source: *EMM “ECCOMMDisinfo”* index. Period: 2023-01-01 to 2024-09-28.
Note: Clustering was performed on headlines. Headlines not similar to any of the groups are not considered in the distribution across topics *(Clustered: 312, Total: 461)*. Similarity, includes also the similar length of titles and mentions of names.

5. Conclusions

Three main conclusions can be inferred from this report on the coverage of alternative proteins by European online media outlets and unverified sources:

1. Alternative proteins are intertwined with national food traditions since they have a direct impact on diets and food production. Opponents have used this argument by portraying alternative proteins as a threat to national food cultures and traditions, making the topic not only a scientific or environmental issue but also a matter of values and national identity

2. The lack of rapid response by EU institutions regarding the commercialisation of synthetic meat or the use of names traditionally associated with meat products has encouraged Member States to take action to fill this gap, often in ways that contradict scientific research and the EU's goals of food and environmental sustainability. This could not only distort the EU market and affect start-ups and firms investing in alternative proteins but also undermine efforts towards sustainable food production in the future.

3. **'Alternative proteins' is a** polarising topic due to the technological innovation and the highly innovative techniques used. The difficulty for the general audience to grasp technological aspects makes the subject more susceptible to disinformation and misinformation from detractors, who tend to criticise the scientific evidence and promote alleged health risks. More accurate and accessible science communication for non-technical audiences would be beneficial in this regard.

Appendix

Query: Alternative Proteins

Articles relevant for the analysis were selected by searching for the following set of keywords. We considered articles that mention at least one of the terms at least once in the title or in the first 300 characters of the news articles published by the source selection. These keywords were translated into all EU24 languages.

+(title OR description:(**“**3d printed meat” OR “algae proteins” OR “alternative proteins” OR “artificial meat” OR “cultured meat” OR “foodtech” OR “in-vitro meat” OR “insect proteins” OR “lab-grown meat” OR “mycoprotein” OR “plant-based proteins” OR “synthetic meat\"
" OR “3D печатно месо” OR “протеини от водорасли” OR “алтернативни протеини” OR “изкуствено месо” OR “култивирано месо” OR “FoodTech” OR “ин витро месо” OR “протеини от насекоми” OR “лабораторно отгледано месо” OR “микопротеин” OR “растителни протеини” OR “синтетично месо” OR “3D potištěné maso” OR “bílkoviny z řas” OR “alternativní proteiny” OR “umělé maso” OR “uměle pěstované maso” OR “maso in vitro” OR “hmyzí proteiny” OR “Laboratorně vypěstované maso” OR “mykoprotein” OR “rostlinné bílkoviny” OR “syntetické maso” OR “3D-trykt kød” OR “algeproteiner” OR “alternative proteiner” OR “kunstigt kød” OR “dyrket kød” OR “in vitro-kød” OR “insektproteiner” OR “laboratoriedyrket kød” OR “plantebaserede proteiner” OR “Syntetisk kød” OR “3D-gedrucktes Fleisch” OR “Algenproteine” OR “Alternative Proteine” OR “künstliches Fleisch” OR “kultiviertes Fleisch” OR “In-vitro-Fleisch” OR “Insektenproteine” OR “Laborgezüchtetes Fleisch” OR “Mykoprotein” OR “Proteine auf pflanzlicher Basis” OR “synthetisches Fleisch” OR “Τρισδιάστατο τυπωμένο κρέας” OR “πρωτεΐνες άλγης” OR “εναλλακτικές πρωτεΐνες” OR “τεχνητό κρέας” OR “καλλιεργημένο κρέας” OR “τεχνολογία τροφίμων” OR “κρέας in vitro” OR “πρωτεΐνες εντόμων” OR “κρέας που καλλιεργείται σε εργαστήριο” OR “μυκοπρωτεΐνη” OR “φυτικές πρωτεΐνες” OR “συνθετικό κρέας” OR “Carne impresa en 3D” OR “Proteínas de algas” OR “proteínas alternativas” OR “carne artificial” OR “carne cultivada” OR “carne in vitro” OR “proteínas de insectos” OR “Carne cultivada en laboratorio” OR “micoproteína” OR “proteínas de origen vegetal” OR “carne sintética” OR “3D trükitud liha” OR “vetikate valgud” OR “Alternatiivsed valgud” OR “kunstliha” OR “kultiveeritud liha” OR “in vitro liha” OR “putukavalgud” OR “laboris kasvatatud liha” OR “mükoproteiin” OR “taimsed valgud” OR “sünteetiline liha” OR “3d painettu liha” OR “leväproteiinit” OR “vaihtoehtoiset proteiinit” OR “keinotekoinen liha” OR “viljelty liha” OR “in vitro -liha” OR “Hyönteisproteiinit” OR “laboratoriossa kasvatettu liha” OR “mykoproteiini” OR “kasviperäiset proteiinit” OR “synteettinen liha” OR “Viande imprimée en 3D” OR “protéines d'algues” OR “protéines alternatives” OR “viandes artificielles” OR “viandes de culture” OR “Viande in vitro” OR “protéines d'insectes” OR “viande cultivée en laboratoire” OR “mycoprotéine” OR “protéines végétales” OR “viandes synthétiques” OR “Feoil phriontáilte 3D” OR “próitéiní algaí” OR “próitéiní malartacha” OR “feoil shaorga” OR “feoil saothraithe” OR “teicneolaíocht bhia” OR “feoil in vitro” OR “próitéiní feithidí” OR “feoil a fhástar sa tsaotharlann” OR “míceapróitéin” OR “próitéiní plandabhunaithe” OR “feoil shintéiseach” OR “3D tiskano meso” OR “proteini algi” OR “alternativne bjelančevine” OR “umjetno meso” OR “uzgojeno meso” OR “in vitro meso” OR “proteini kukaca” OR “meso uzgojeno u laboratoriju” OR “mikoprotein” OR “proteini biljnog podrijetla” OR “sintetsko meso” OR “3D nyomtatott hús” OR “algafehérjék” OR “alternatív fehérjék” OR “mesterséges hús” OR “tenyésztett hús” OR “in vitro hús” OR “rovarfehérjék” OR “laboratóriumi hús” OR “növényi alapú fehérjék” OR “szintetikus hús” OR “Carne stampata 3D” OR “proteine delle alghe” OR “proteine alternative” OR “carne artificiale” OR “carne coltivata” OR “carni in vitro” OR “proteine degli insetti” OR “carni coltivate in laboratorio” OR “micoproteina” OR “proteine vegetali” OR “carni sintetiche” OR “3d atspausdinta mėsa” OR “dumblių baltymai” OR “Alternatyvūs baltymai” OR “dirbtinė mėsa” OR “dirbtiniu būdu išauginta mėsa” OR “Foodtech” OR “in vitro mėsa” OR “vabzdžių baltymai” OR “laboratorijoje užauginta mėsa” OR “mikoproteinas” OR “augaliniai baltymai” OR “sintetinė mėsa” OR “3D drukāta gaļa” OR “aļģu proteīni” OR “alternatīvi proteīni” OR “mākslīgā gaļa” OR “audzēta gaļa” OR “pārtikas tehnoloģija” OR “in vitro gaļa” OR “kukaiņu proteīni” OR “labībā audzēta gaļa” OR “mikoproteīns” OR “augu izcelsmes proteīni” OR “sintētiskā gaļa” OR “3D laħam stampat” OR “proteini tal-algi” OR “proteini alternattivi” OR “laħam artifiċjali” OR “laħam ikkultivat” OR “teknoloġija tal-ikel” OR “laħam in vitro” OR “proteini tal-insetti” OR “laħam imkabbar fil-laboratorju” OR “mikoproteina” OR “proteini bbażati fuq il-pjanti” OR “laħam sintetiku” OR “3D-geprint vlees” OR “algeneiwitten” OR “Alternatieve eiwitten” OR “kunstmatig vlees” OR “kweekvlees” OR “vlees in vitro” OR “insecteneiwitten” OR “Vlees van kweeklaboratoria” OR “mycoproteïne” OR “plantaardige eiwitten” OR “synthetisch vlees” OR “Mięso drukowane 3D” OR “białka alg” OR “Alternatywne białka” OR “sztuczne mięso” OR “mięso hodowlane” OR “mięso in vitro” OR “białka owadów” OR “mięso hodowane w laboratorium” OR “mikoproteiny” OR “białka roślinne” OR “mięso syntetyczne” OR “Carne impressa em 3D” OR “proteínas de algas” OR “proteínas de insetos” OR “carne cultivada em laboratório” OR “Proteínas vegetais” OR “Carne tipărită 3D” OR “proteine din alge” OR “carne artificială” OR “carne de cultură” OR “Carne in vitro” OR “proteine din insecte” OR “carne cultivată în laborator” OR “micoproteină” OR “proteine pe

bază de plante” OR “carne sintetică” OR “3D tlačené mäso” OR “proteíny z rias” OR “alternatívne proteíny” OR “umelé mäso” OR “kultivované mäso” OR “Mäso in vitro” OR “proteíny hmyzu” OR “Laboratórne vypestované mäso” OR “mykoproteín” OR “rastlinné bielkoviny” OR “syntetické mäso” OR “3D natisnjeno meso” OR “beljakovine alg” OR “Alternativni proteini” OR “umetno meso” OR “kultivirano meso” OR “živilska tehnologija” OR “meso in vitro” OR “beljakovine žuželk” OR “Laboratorijsko pridelano meso” OR “rastlinske beljakovine” OR “sintetično meso” OR “3d tryckt kött” OR “algproteiner” OR “Alternativa proteiner” OR “konstgjort kött” OR “odlat kött” OR “In vitro-kött” OR “insektsproteiner” OR “Labbodlat kött” OR “Växtbaserade proteiner” OR “syntetiskt kött” OR “микропротеини” OR “laboratoriedyrket kød” OR “mykoprotein” OR “kultiviertes Fleisch” OR “Laborfleisch” OR “pflanzliche Proteine” OR “carne de laboratorio” OR “keinoliha” OR “Proteini alga” OR “Alternativne Proteini” OR “laboratorijā audzēta gaļa” OR “laħam ikkultivat in vitro” OR “kweekvlees” OR “carne cultivată” OR “gezüchtetes Fleisch” OR “Fleisch aus dem 3D-Drucker” OR “Steak aus dem 3D-Drucker” OR “Algenprotein” OR “Insekten als Nahrungsmittel” OR “Insekten als Proteinquelle” OR “alternative Proteinquelle” OR “insekter som livsmedel” OR “insekter i mat” OR “insekter som mat” OR “alprotein” OR “Proteína de algas”))

Annex I - Methodology

This science media intelligence briefing follows the pilot series of joint publications of the European Science-Media Hub (ESMH) and the JRC Text Mining and Analysis Competence Centre (TMA-CC), covering six different topics ranging from water scarcity, genetically modified organisms and new-genomic techniques to artificial intelligence in science communication as well as in healthcare. For further information please consults https://sciencemediahub.eu/science-media-intelligence-reports/.

Source and data selection

The manually curated list of Mainstream media outlets used for this report is composed of 581 EU27 online media sources monitored as index [pi_ee24campaign] by Europe Media Monitor (EMM). This sample of sources represents the most popular open news websites in each EU country in terms of visitors. The number of outlets per country was weighted based on the member states' population.

The EcommMisinfo source index consists of 548 unverified sources which have been identified by independent fact checkers and other independent as frequently spreading mis- or disinformation. This only includes news pages, not social media channels. There are not unverified sources from all EU member states included and the number of available sources among EU countries varies and changes over time, as the compilation of data is determined, among other things, by access, availability and the work of fact-checkers and independent experts.

Articles relevant for the analysis are selected by searching for a set of relevant keywords or keyword combinations that appear in the title or text of the article. These keywords are translated into all EU24 languages. The keyword combinations have been selected carefully to include all important articles but to avoid irrelevant 'noise' in the news collection.

Automated clustering

Clusters are computed by a community-based algorithm on the original language titles of the articles and are based on semantic similarity. Stopwords were not removed from the titles but are not shown in the keyword section. The model transforms sentences into language-independent vectors, suiting our need to compare articles coming from the various EU countries. It is also easy to use and easy to deploy thanks to its python implementation.

The minimum cluster size is set to 5 articles. The maximum cluster size is not fixed. Depending on the distribution of its neighbours, one document may belong to a cluster or not. In other words, not all articles can be clustered.

Automated titles and summaries

To generate automated summaries for each cluster, we use Large Language Models (LLM). For this use case, the model – an instantiated LLama 3.1 70b – is treated like a news-digest AI which is capable of analysing a list of news articles and generating a high-level summary with a significant title. For each cluster, the translated headlines are provided as input, and a title and a summary were generated for each cluster. The used and openly available Nous-Hermes model allows to receive good quality output in combination with a very fast response time. A carefully-crafted prompt is used so that the model is not too generic and instead always focused on the listed facts. The temperature of the model is set to "0" in order for it to not hallucinate.

Sentiment classifier

In our sentiment analysis, we utilise a state-of-the-art sentiment model, XLM-RLnews-8, which is specifically designed for document-level sentiment analysis across multiple languages. Based on XLM-RoBERTa-Large, this model has been fine-tuned for sentiment analysis using the Unified Multilingual Sentiment Analysis Benchmark (UMSAB) dataset. The sentiment classes are computed on the English translation of the headlines.

To develop this model adapted to the news domain, we started with a multilingual news dataset extracted using the European Media Monitor (EMM) pipeline, which includes 20 000 news headlines and descriptions per language, totalling 24 official languages of the European Union.

We further employed the UMSAB dataset for sentiment fine-tuning, which consists of eight datasets in eight languages, each annotated using three classes: negative, neutral, and positive. XLM-RLnews-8 achieved a macro F1 score of 0.704 on the UMSAB test set, proving its effectiveness in sentiment analysis tasks.

Additionally, the model has been evaluated in out-of-domain scenarios using the IMDb dataset and a silver dataset made of multilingual news headlines in original language and translated to English taken from EMM. On average, the model achieved a weighted F1 score of 0.765, demonstrating its robustness in sentiment analysis across different domains. The model exhibits high precision (0.86) and lower recall (0.77) for the detection of negative sentiment of English translation of headlines. This suggests that the model may miss some negative sentiments but is highly reliable in identifying the sentiment accurately. For positive texts, the model shows a high precision (0.80) and recall (0.71).

More details on the model development are available in:
Di Nuovo, E., Cartier, E., De Longueville, B. (2024). Meet XLM-RLnews-8: Not Just Another Sentiment Analysis Model. In Natural Language Processing and Information Systems, 28th International Conference on Applications of Natural Language to Information Systems, NLDB 2024, Turin, Italy, June 25–27, 2024, Proceedings (pp. 1). Springer Science and Business Media Deutschland GmbH.

Automated detection of framing techniques

Automated detection of framing dimensions constituted an extension of our analysis conducted in this report. This work was based on in-house machine learning classifiers that detect framing dimensions in the articles. The machine-learning algorithm trained on a multilingual corpus.

Framing refers to the perspective under which an issue or a piece of news is presented. We consider 14 frames: *Economic, Capacity and resources, Morality, Fairness and equality, Legality, constitutionality and jurisprudence, Policy prescription and evaluation, Crime and punishment, Security and defence, Health and safety, Quality of life, Cultural identity, Public opinion, Political, External regulation and reputation*.

For more information see the JRC Technical Report: News Categorization, Framing and Persuasion Techniques: Annotation Guidelines: https://knowledge4policy.ec.europa.eu/text-mining/news-categorization-framing-persuasion-techniques-annotation-guidelines_en

Named entities recognition

Names Entities Recognition has been done using the NEROne module which has been developed in the context of the Europe Media Monitoring project. For detailed information, see: *Guillaume Jacquet, Jakub Piskorski, and Sophie Chesney. 2019. Out-of-context fine-grained multi-word entity classification. In Proceedings of the 34th ACM/SIGAPP Symposium On Applied Computing (SAC 2019).*

Understanding values

When referring to values in this report, we refer to the personal values model developed in social psychology research and validated in over 80 countries in over 200 samples (Schwartz 1992). These values are expressed as "guiding principles of life", such as security, freedom or equality. Research has shown that people everywhere appreciate these values to varying degrees.

The JRC flagship report "Values and Identities – A Policymaker's Guide" (Scharfbillig et al. 2021) has summarised the most important elements of values for understanding citizens' concerns and views. Here is an overview of the meaning of the values used in this study:

VALUES	INTERPRETATION
SELF-DIRECTION	Valuing independent thought and action—choosing, creating, exploring
STIMULATION	Valuing excitement, novelty and challenge in life
HEDONISM	Valuing pleasure or sensuous gratification for oneself
ACHIEVEMENT	Valuing personal success through demonstrating competence
POWER	Valuing social status and prestige, control or mastery over people and resources
SECURITY	Valuing safety, harmony, and stability of society, of relationships, and of own identity
CONFORMITY	Valuing restraint of actions likely to upset or harm others or violate norms and rules
TRADITION	Valuing respect, and acceptance of the customs that one's culture or religion provides
BENEVOLENCE	Valuing preserving and enhancing the welfare of others especially close ones
UNIVERSALISM	Valuing understanding, tolerance, and protection for the welfare of all people and for nature

For detailed information, see:

Schwartz SH. Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. Adv Exp Soc Psychol. 1992;25(C):1-65. doi:10.1016/S0065-2601(08)60281-6

Scharfbillig, M., Smillie, L., Mair, D., Sienkiewicz, M., Keimer, J., Pinho Dos Santos, R., Vinagreiro Alves, H., Vecchione, E., Scheunemann L., Values and Identities - a policymaker's guide, EUR 30800 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-40965-6, doi:10.2760/349527, JRC126150.

Annex II - About the authors

Text Mining & Analysis Competence Centre (TMA-CC)

DG JRC's Text Mining & Analysis Competence Centre (TMA-CC) of the European Commission is specialised in making sense of vast amounts of text through computing and analytics. It is an in-house consultancy and innovation service supporting EU Institution's policymakers, investigators and analysts in their knowledge-intensive tasks by providing consultancy and advanced analytical tools in the field of text mining.

The TMA-CC aims to be an incubator for text mining ideas and solutions within the European Commission - a single focal point where expertise is concentrated, then shared and applied to the benefit of its clients.

Please check https://knowledge4policy.ec.europa.eu/text-mining_en for more information on TMA-CC.

European Science-Media Hub

The European Science-Media Hub (ESMH), operating under the political responsibility of the European Parliament Panel for the Future of Science and Technology (STOA), is a platform to promote networking, training and knowledge sharing between the European Parliament, the scientific community and the media.

The ESMH creates a network among policy-makers, scientists and media involving science, academia, educational and research entities, and professional associations of journalists and scientists. For journalists and media representatives, the ESMH organises training sessions and workshops on current technological developments, both as subjects of their reporting and as means of facilitating their work. Via media monitoring and media intelligence tools, the ESMH follows the most popular topics in the field of science and technology on different platforms including journals, newspapers and social media.

The ESMH makes information available to journalists, other media and citizens about new scientific developments, as well as about scientific topics that attract media attention, and promotes information based on evidence.

Check https://sciencemediahub.eu/ for more information, methodology and technology.

Europe Media Monitor

Europe Media Monitor (EMM) is a tool developed and maintained by the Text and Data Mining Unit of the Joint Research Centre (JRC) of the European Commission. The main purpose of EMM is to provide monitoring of a large set of online media, reducing the information flow to manageable proportions by clustering related news, categorising articles and applying Language Technology tools to derive further metadata, such as recognising and disambiguating entities in the text, extracting quotes by and about people, applying sentiment/tonality analysis and more. Since 2018, EMM can also grab content from live Twitter streams.

A lot of EMM's functionalities are freely available. To access the tool that best fits your need, please check https://knowledge4policy.ec.europa.eu/text-mining/topic/europe-media-monitor-emm_en.

Getting in touch with the EU

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All over the European Union there are hundreds of Europe Direct centres. You can find the address of the centre nearest you online (european-union.europa.eu/contact-eu/meet-us_en).

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— at the following standard number: +32 22999696,

— via the following form: european-union.europa.eu/contact-eu/write-us_en.

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Information about the European Union in all the official languages of the EU is available on the Europa website (european-union.europa.eu).

EU publications

You can view or order EU publications at op.europa.eu/en/publications. Multiple copies of free publications can be obtained by contacting Europe Direct or your local documentation centre (european-union.europa.eu/contact-eu/meet-us_en).

EU law and related documents

For access to legal information from the EU, including all EU law since 1951 in all the official language versions, go to EUR-Lex (eur-lex.europa.eu).

EU open data

The portal data.europa.eu provides access to open datasets from the EU institutions, bodies and agencies. These can be downloaded and reused for free, for both commercial and non-commercial purposes. The portal also provides access to a wealth of datasets from European countries.

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