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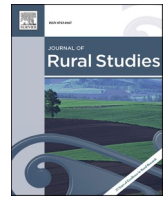
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A critical evaluation of the potential of an online agricultural forum as a space for supporting farmer well-being

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ABSTRACT

Farming is associated with low levels of individual well-being with recent research exploring influencing factors, resulting consequences and potential support opportunities. Exploration of how online peer-to-peer interactions may support farmer well-being is yet to be fully explored despite suggestions that many turn to the internet when facing farming challenges. This original research study examined the potential of an online agriculturally focused forum, The Farming Forum (TFF), as a space for supporting farmer well-being, exploring the more varied formats of peer support and building on existing landscapes of support literature. Forum posts were analyzed using methods of sentiment analysis, classification of forum participant behavior, and reflexive thematic analysis. TFF acts as an information repository for farmers, based heavily on the lived experiences of those farming within the UK and beyond. This study revealed the willingness of farmers to share experiential knowledge they felt would benefit others with likely positive impacts on the well-being of those involved. Whilst there may have been more limited explicit reference to individual well-being outside of a specific 'suicidal thoughts' discussion thread, findings suggested TFF could enable and host conversations around farmer wellbeing. TFF offered a space for farmers to hold discussions with like-minded individuals and allowed them to seek advice or information anonymously. Whilst there appeared some limitations surrounding the forums' ability to professionally support farmer well-being due to the potential for negative remarks and disclosure of identifying information, these could be overcome with a degree of forum management. TFF likely has an influence on the well-being of those farmers utilizing the forum and this paper offers a starting point for further research in this area.

1. Introduction

The term 'well-being' ("*centering on a state of equilibrium ... stable well-being [achieved] when individuals have the psychological, social and physical resources they need ...*" (Jones et al., 2024)) is often positioned synonymously alongside the term 'mental health' ("*a state of mind characterized by emotional well-being, good behavioral adjustment, relative freedom from anxiety ...*" (Jones et al., 2024)), both terms going beyond the absence of mental ill health and encompassing the perception that life is going well (Huppert, 2009). Well-being can be considered a broader term, acknowledged to also include physical health (Hammersley et al., 2021).

Farming is an occupation associated with low levels of individual well-being (Gregoire, 2002) with existing research having explored influencing factors, consequences of (predominantly poor) farmer

well-being and opportunities for support. Farming is a hazardous occupation (RABI, 2021) and those working alone for long hours can face social isolation and loneliness (Nye et al., 2021). Many other factors have also been confirmed to negatively impact farmer well-being including (but not limited to) gender inequalities (Budge and Shortall, 2022), retirement and succession planning (Riley, 2014), animal disease (Crimes and Enticott, 2019), rural crime (Smith, 2020), the effect of new technologies (Russell et al., 2023), climate change (Lobley et al., 2004), assurance schemes (Russell et al., 2023) and farm finances (Batterham et al., 2022). Despite topics identified to negatively influence farmer well-being and increasing literature around farmer well-being support opportunities (Shortland et al., 2022), there remain barriers preventing farmers from seeking support. Barriers can include financial implications of gaining support (Hagen et al., 2019) (including appointment costs, transport, and paying employees to cover time taken away from

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farm), time needed to attend appointments (Wheeler and Lobley, 2023), perceptions of health professionals being unaware of farming challenges (Shortland et al., 2022), as well as the stigma attached to seeking support for mental health or well-being (Perceval et al., 2018).

Identification of well-being challenges within farming populations has led to agriculturally focused support separated from mainstream support services due to their immersion in the industry (Shortland et al., 2022). Whilst these support organizations look to support farming individuals, families and rural communities, they are not the only people farmers may turn to in times of need nor are they likely the only ones witnessing farmer well-being struggles. Farmers are less likely (than non-farmers) to present to their general practitioner (GP) to discuss mental health challenges (Klingenschmidt et al., 2017) although there are suggestions that farmer well-being discussions occur socially, between peers at Young Farmer groups (Rose et al., 2023a), and between farmers and agricultural advisors, veterinarians and auction employees (Hammersley et al., 2021; Martin, 2020; Nye et al., 2021; O'Reilly et al., 2023); individuals who fall within their 'landscapes of support' (Rose et al., 2023a,b; Shortland et al., 2022).

Increasing awareness of the impact of poor farmer well-being by academics, government policy makers and the media, has seen the number of research studies examining farmer well-being increasing (Worshipful Company of Farmers, 2019). These research studies often focus on isolated well-being impacts and reliance on farmers' directly disclosing information, despite awareness of farmers seeking help from their own communities (e.g. peers) or professionals within their own communities (e.g., veterinarians, auctioneers, advisors) (Hammersley et al., 2021; Lamont et al., 2024; Martin, 2020; Nye et al., 2021; O'Reilly et al., 2023; Rose et al., 2023) before reaching out to those in more formal positions of support (e.g. GPs) (Klingenschmidt et al., 2017). With reliance on direct disclosure of influencing factors and effectiveness of available support, the stoic nature of farmers may result in information being intentionally or unintentionally omitted from discussions (Hillel et al., 2017; Judd et al., 2006). Therefore, there is value in exploring naturally occurring conversations where discussions of well-being may or may not intentionally arise.

A 2019 scoping review of mental health outcomes in farming populations by Hagen et al. (2019) found research studies conducted across 27 countries and several farmer types (e.g., animal farmers, plant farmers, migrant farm workers), often utilizing primary data sources with a focus toward the (negative) mental health outcomes of stress, suicide or depression. Just 20 of 341 studies referred to mental health services or resources, warranting a need to further explore the impact of services specifically tailored to farmers and their impact on farmer well-being. More recently, research studies have continued to highlight a need to identify and evaluate potential support interventions (Hagen et al., 2021; Schossow et al., 2022) available to farmers, with research by Rose et al. (2023a,b) suggesting farmer support comes from a range of organizations and individuals. Whilst peers have been recognized as potential well-being support for farmers and farming populations (Deegan and Dunne, 2022; Rose et al., 2023a,b) much research around farmer peer-to-peer interactions has focused on knowledge exchange and learning opportunities (O'Connor et al., 2020; Sutherland and Marchand, 2021), rather than their potential to support individual well-being, although it is likely that some peer-to-peer support comes alongside peer-to-peer learning (Morgans et al., 2021).

This research study looked to explore the role of an online agriculturally focused forum and its potential as a space for supporting the well-being of farmers through peer-to-peer support. The study looked to build on findings from existing research around farmer landscapes of support, exploring a general agricultural forum where topics of well-being may not be the focus of discussions and observing the interactions occurring between registered users. In conducting a critical evaluation of the forum's potential ability to support the well-being of farmers, two research questions were posed;

- (1) How do registered users on an agriculturally focused online forum respond to posts containing topics which have the potential to impact farmer well-being?
- (2) To what extent does an online agricultural forum support farmer well-being?

Farmer peer relationships (relationships based on shared characteristics allowing emotional, informational and appraisal support (Dennis, 2003)) have been explored in relation to information sharing (Sutherland and Marchand, 2021; Wood et al., 2014), seen by some farmers as being more valuable than knowledge from experts (Rust et al., 2021) and occurring during farm demonstrations (Sutherland and Marchand, 2021), auction market events (Nye et al., 2021) and online through social media platforms or online forums (Rust et al., 2021). These group learning opportunities support links between individual well-being and feelings of empowerment (Friis-Hansen and Duveskog, 2012). The potential for peer-to-peer relationships to occur online may overcome some barriers associated with seeking real-life support (Hagen et al., 2019; Perceval et al., 2018; Shortland et al., 2022; Wheeler and Lobley, 2023) and allow experience sharing that may have once occurred "over a farm gate" (Burbi and Rose, 2016 p.1), although little appears to be known around how farmers navigate online technologies to develop peer relationships and how they use them to discuss topics of well-being (if at all).

Peer-to-peer support amongst farmers has been investigated with generally positive findings, although the focus has been predominantly on in-person peer-to-peer learning and knowledge acquisition during activities such as participatory extension programs (PEP) rather than on its potential to support farmer well-being. Involvement in PEP has been shown to lead to impacts on farmer well-being even if it is not the focus of the activity (Knook et al., 2022) implying that other peer-to-peer learning or knowledge acquisition opportunities may also impact farmer well-being, although this could be explored further. The "close-knit nature of rural communities" (Shortland et al., 2022 p.136) where individuals know each other well may influence farmers' use of formal support services for fear of others finding out, and therefore they may look to gain well-being support from peer-to-peer occupational interactions that occur online and with those they do not know in real life.

It is likely not all peer-to-peer interactions amongst farmers are positive, although this topic appears relatively unexplored. Farming is subject to strong cultural norms which, when deviated from, could result in criticism from others or see individuals facing peer pressure to conform (Wicklow and Shortall, 2024). Some farmers may be unwilling or reluctant to share ideas with others (Morgans et al., 2021) and many hold concerns over how others may see them or their farming enterprise (Hagen et al., 2021; Hagen et al., 2022) which may limit involvement in, or the benefits which can be gained from peer-to-peer interaction.

1.1. Online forum use and online technology use by farmers

Some research around online forum utilization has seen positive results for those actively (reading and making posts) and passively (reading posts) involved (van Uden-Kraan et al., 2008). Online forums allow asynchronous interactions where participants join discussions at their convenience (Im and Chee, 2006) and it may be that should a topic of interest arise, a passive user could become an active user. For those reliant on informal networks, online forums can be valuable sources of information (Hill and Weinert, 2004), offering social support through anonymous discussions (Heyes, 2017). Well-being research has focused predominantly on how online forums are used by those seeking medical advice or support; providing a more comfortable environment than face-to-face groups for discussing sensitive issues (Kramish Campbell et al., 2001) and allowing individuals to be more open than they would be in real life (Flicker et al., 2004). Despite these suggested benefits, not all online forum research suggests entirely positive results with

cyber-bullying supported by forum anonymity (Moore et al., 2012) and potential exposure to harmful or inaccurate information (Arora et al., 2023; Nasralah et al., 2018). Other negative impacts of online forums can include overdependency (Lawlor and Kirakowski, 2014), online exclusion (where posts receive little or no response (Schneider et al., 2017), fear of missing out (Przybylski et al., 2013) (FoMo), reinforcement of harmful ideologies (Haas et al., 2010; Marchant et al., 2018) and false information being provided by users due to lack of accountability, increasing individual popularity but also increasing levels of depression and deleted posts (Mun and Kim, 2021; Wright et al., 2018).

Whilst research surrounding online forum use by farming populations remains limited, research by Prost et al. (2022) found farmers at ease with online social media, using WhatsApp and Facebook to educate themselves, gain reassurance, and extend their real-life peer groups, likely reducing feelings of loneliness and isolation (Riley and Robertson, 2022). The use of online social media by farmers to watch ‘influencers’ and build peer relationships has been shown to support and in some instances replace the use of traditional experts (Oreszczyn et al., 2010; Rust et al., 2021; Skaalsveen et al., 2020) although it has been suggested that farmers take what they find “with a pinch of salt” (Rust et al., 2021 p.36) implying awareness that not all information found online is correct. Some farmers have been found to use social media to communicate their day-to-day lives and showcase farmer identities, online platforms offering a space to express feelings, although negative emotions appear expressed through contextualized rather than personalized factors (Riley and Robertson, 2021).

Whilst farmers likely encounter supportive information online, internet users can be exposed to misinformation, disinformation and malinformation (Wardle and Derakhshan, 2017), as supported by Chowdhury et al. (2023) who confirm this with online agricultural content where science-based evidence is discredited by individuals who take their own narratives to social media. Farmers using social media may be exposed to negative content around the agricultural industry which can be directed at individuals or posed more generally. Productivity-orientated agriculture is spoken about online more negatively than nature-orientated agriculture (Boehm et al., 2010) and some dairy content on TikTok is openly criticized (Ostapovich, 2023). German farmers spoken to by Dürnberger (2019) found that in their direct communications with the public they could be exposed to directed (constructive and personal) criticism which they considered burdensome, whilst Robertson and Riley (2021) found when farmers used social media to showcase day-to-day farming more publicly, they could receive criticism as well as positive comments.

Despite studies showing farmers utilize the internet and social media platforms, there remains limited critical investigation of how farmers utilize online agriculturally focused forums and how they may use these to seek or offer peer well-being support. Exploration of an online mental health forum designed for farmers (by a mental health organization) by Kilpatrick et al. (2023) found them to be positive spaces, offering diverse information “moulded to individuals’ needs and preferences” (p.170), continuously available in a place away from local people. Whilst positive findings, there is potential that those farmers who sought involvement in this forum had been facing mental health challenges themselves or were looking to support others with possibly different findings seen with exploration of a general agricultural online forum. A general agricultural forum may attract users seeking to discuss various topics rather than specifically rural mental health as in the instance of Kilpatrick et al. (2023). Peer-to-peer interactions may be similar to those which occur in real-life offering the chance to explore more naturally occurring interactions where well-being is covered in a less artificial way.

With findings from the 2021 Royal Agricultural Benevolent Institution (RABI) Big Farming Survey suggesting one third of farmers to be probably or possibly depressed, this research study looked to examine the potential of a UK based agricultural online forum in supporting farmer well-being. There are several UK agriculturally focused online forums, the largest of which is The Farming Forum (TFF), launched in

2013 with over 45,000 registered users in 2020 and receiving an average of 8.5 million page views each month (The Farming Forum, 2021a,b). In 2021, TFF was suggested to be visited daily by between 30,000 and 50,000 individuals (Ingram et al., 2021), a number likely rising with increased broadband availability (NFU, 2023) although it is not possible to identify what proportion of these individuals were registered users or guests to the site. TFF is UK based, and whilst many individuals likely live or farm in the UK, those in other locations can become registered users, start new discussion threads and contribute to those already existing. The discussion topics present and the peer-to-peer interactions which occur on TFF are not likely isolated to those living or farming in the UK, and therefore the findings from this research study could have consequences for online forums operating in other locations and highlight benefits for farmer well-being beyond the UK.

2. Methods

Data collection by the lead researcher occurred between March and May 2024 and involved the extraction of initial posts and replies from TFF. TFF hosts thousands of discussion threads and many more posts, so a sample was selected for manual analysis with acknowledgement that a limitation is lack of examination of all initial posts and replies on the forum for practical reasons. An automated computer software programme would be recommended for comprehensive analysis of all posts. The sample considered all initial posts (n = 2605) posted between March 1, 2023 and February 29, 2024 within publicly available topic forums surrounding a topic area identified from a literature search as potentially able to influence farmer well-being (Table 1). A single thread located within the ‘agricultural matters’ topic forum (an overarching topic forum) was also analyzed independently due to it explicitly addressing farmer well-being in the title (“*Dealing with depression-suicidal thoughts. Join the conversation*”) having been initially posted in June 2013.

The content of initial posts was manually copied verbatim into a Microsoft Office Excel spreadsheet. In seeking to explore peer-to-peer interactions, replies to topic forum initial posts were collected in line with initial posts (n = 6000) until data saturation was felt to have been reached by the lead researcher with no new themes around peer-to-peer interactions identified within the previous 250 replies. An additional 500 replies were extracted from the ‘suicidal thoughts’ thread to be analyzed separately. Within TFF, whilst it was not possible to identify whether registered users were all farmers or identified as such, the term ‘farmer’ has been utilized to describe any user of the forum whilst acknowledging that some could identify differently.

To identify themes in initial TFF posts and replies, a reflexive thematic analysis following the six-stage process of Braun and Clarke (2006) was utilized. In examining TFF forum discussions through reflexive thematic analysis, it was possible to collect data not influenced by the presence of a researcher and allowed the real-life experiences of those being observed to be collated. This approach saw breadth rather than depth of data to be valuable, not looking to go below the surface and speak with those posting, instead capturing naturally occurring conversations without researcher involvement in the conversations.

Whilst online forums are reliant on written communication where

Table 1
Topic forums examined within research study and number of initial posts examined.

Fitness and Weight Loss (n = 10)	Manflu Corner (n = 37)	Community Feedback (n = 21)
Crime and Security (n = 41)	Food from the Farm (n = 10)	Parenting and Children (n = 2)
Weather (n = 108)	Politics (n = 286)	Livestock and Forage (n = 1435)
Family and Farming (n = 24)	Pig and Poultry (n = 101)	Dairy Farming (n = 530)

there can be loss of textual features (e.g., non-verbal cues and tone of voice) (Im and Chee, 2006), spacing and emoticons may provide cues around user emotional state (Pudaruth et al., 2018). Sentiment in the written TFF text was objectively analyzed using computer associated qualitative data analysis software NVivo (version 12) to allow tracking of attitudes and feelings within the text, classified using built in lexicons for positive and negative sentiment. This method had been previously used to explore how consumer thoughts around animal agriculture were influenced by images (Mahon et al., 2023) and how those using online support forums pose their comments around perinatal experiences (Chivers et al., 2020) indicating it is a viable option within this research study to explore the level of sentiment within both initial posts and reply posts.

In seeking to explore what was said between online forum users in an unguarded context, quantitative data analysis methods utilized within previous research studies examining online forums were employed alongside manual reflexive thematic analysis. Reply posts were classified according to their offering either directional or non-directional support; a method appearing first used by Prescott et al. (2017) in their exploration of online teen support forums where support could be given through either sharing of own experiences (non-directional support) or explicit recommendations for actions (directional support). The same classification was also applied to initial posts, having previously been used by McKiernan et al. (2017) to identify if initial posts on online forums were explicitly seeking information (directional) or looking to share experiences (non-directional).

Further grouping of post replies was made according to whether a reply contributed or detracted from critical thinking, a method used by several researchers previously investigating online forums (Costley, 2016; Marra et al., 2004; Sing and Khine, 2006; Song, 2012), based on a model originally presented by Newman et al. (1995). Replies were categorized as positive or negative within coded categories of ‘relevance’, ‘novelty’ and ‘practical utility’ to support exploration of TFF as a potential space for supporting farmer well-being. Within the category of relevance, positive replies were those deemed relevant to the initial posts whilst negative replies were irrelevant (e.g., presenting a new topic). Within the category of novelty, positive replies gave new ideas whilst negative replies saw repeated ideas. Within the category of practical utility, positive replies gave practical solutions (e.g., methods for storing livestock feed) whilst negative replies gave impractical solutions (e.g., self-injecting veterinary drugs into humans).

2.1. Ethical approval and anonymity of data

Ethical approval for this research study was granted by the Royal Agricultural University (Cirencester, UK) and the University of Gloucester (Cheltenham, UK). This research did not receive any specific grant from

funding agencies in the public, commercial, or not-for-profit sectors. Initial post and reply post content was extracted verbatim from TFF which raised concerns over how content should be presented within this research study in a way that minimized harm whilst offering depth of information. Whilst direct quotes can bring content to life (White et al., 2014) and signify richness of data (Yin, 2011), TFF confirms itself to “Google exceptionally well” (The Farming Forum, 2021a,b) and initial post and reply post content entered into search engines (in full or part) was shown to bring up the TFF thread which content could be found within and with this, the user who had posted the content, supporting the comments of TFF and King (1996) who confirmed web search engines can make it easy to find the source of text online. Although TFF users create a profile and only include identifiable information in either their profile or posts should they desire, they were unaware at the time of posting on the forum that comments would later be extracted for a research study. As a result of this and comments by Wiles et al. (2012) suggesting future harm from identifying research study participants cannot always be reliably predicted, it was felt that to prevent well-being impacts which could arise should TFF comments be made public and traceable, that quotes would be reworded to offer confidentiality for TFF forum users.

3. Results

TFF allows information sharing on a diverse range of topics whilst retaining an agricultural focus with 67 topic forums (e.g., Dairy Farming, Cropping, Agricultural Matters) found within 15 overarching categories (e.g., Livestock, Arable, Farm Business). The forum is constantly accessible with multiple threads running concurrently with initial posts and reply posts having been posted each day across the year within the sample examined.

3.1. Sentiment analysis of initial posts and reply posts

Sentiment analysis demonstrated more negative sentiment within initial posts and reply posts than positive sentiment (Fig. 1);

3.2. Forum participant behavior within initial post and reply posts

Initial posts and reply posts were classified in relation to forum participant behavior (Table 2); In considering critical thinking, reply posts were categorized positively or negatively across three areas; relevance, novelty and practical utility. In some instances, it was not possible to determine if a reply post contributed positively or negatively, and these were considered NA (Table 3).

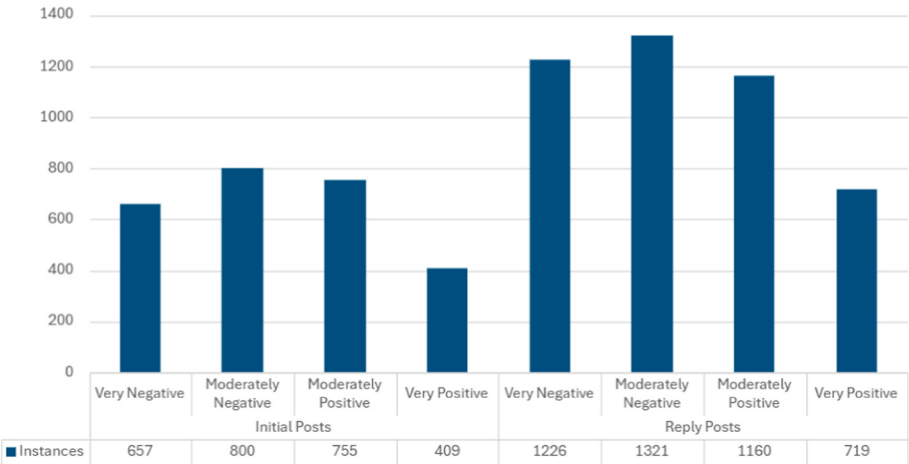


Fig. 1. Instances of sentiment within TFF initial posts and reply posts examined.

Table 2

Forum participant behavior within initial and reply posts.

Type of Post	Explanation	Occurrence	Example Quote
Directional initial post.	Initial post sought information, posing a question implicitly or explicitly.	2014 initial posts (77.31 %).	[Is anyone able to recommend a suitable tracking device that would deter theft and support recovery?]
Non-directional initial post.	Initial post shared personal information.	122 initial posts (4.68 %).	[I have shooting permission on a farm containing a stream with signal crayfish ... we are going to put some of them in a curry dinner]
NA initial post.	Initial post presented an image, URL, or statement.	469 initial posts (18 %).	[Local chicken producer closed down]
Directional support reply.	Reply post gave explicit recommendations.	1217 reply posts (20.28 %).	[Maybe you could consider employing someone who is a little older, who will work because they miss the job rather than because they need the money]
Non-directional support reply.	Reply post shared personal experiences.	2749 (33.9 %).	[I told my daughter off for misbehaving at dinner and my mother-in-law didn't talk to me for several months]

3.3. Forum post reflexive thematic analysis

Reflexive thematic analysis of initial posts found four overarching themes within the initial posts, with acknowledgement that there was a greater degree of negative sentiment in initial posts. These were (1) appraising the future of agriculture, (2) circulating available information relating to the industry, (3) seeking advice or information, and (4) the place of farming in society (Table 4);

Reflexive thematic analysis of reply posts also found four

overarching themes, each considering the effect that the peer-to-peer interaction had on the discussion with again, a greater degree of negative than positive sentiment found. The four themes were (1) closing down the discussion, (2) non-definable effect on the discussion, (3) broadening the discussion with explicit links to personal experience, and (4) broadening the discussion without explicit links to personal experience (Table 5).

Table 3

Critical thinking reply posts.

Reply Post Classification	Explanation	Occurrence
Relevance- Positive	Relevant reply given.	3885 reply posts (64.75 %)
Relevance- Negative	Irrelevant reply given.	1532 reply posts (25.53 %)
Relevance- NA	Undetermined reply post.	583 reply posts (9.71 %)
Novelty- Positive	Provision of new ideas.	168 reply posts (2.8 %)
Novelty- Negative	Provision of repeated ideas.	2045 reply posts (34.08 %)
Novelty- NA	No idea was provided.	3787 reply posts (63.11 %)
Practical Utility- Positive	Practical solution provided.	1996 reply posts (33.27 %)
Practical Utility- Negative	Impractical solution provided.	34 reply posts (0.54 %)
Practical Utility- NA	No solution provided.	3790 reply posts (66.17 %)

Table 4

Overarching themes within initial posts.

Overarching Theme	Description	Example Quote
Appraising the future of agriculture.	Discussing the future of UK (or world) agriculture without questioning it, considering future challenges, calls for farmers by industry researchers, and lacking preparation for the future by current and past generations.	[It seems every article and public discussion positions dairy negatively ... these articles and discussions are likely to make it very difficult for dairy farmers trying to earn a living]
Circulating available information relating to the industry.	Circulating rather than seeking information, based on personal experience or external sources in written word, images or URLs to online articles which may have been present in isolation or accompanied by text.	[good for AHDB for doing this [screenshot], so much for those who say they aren't doing anything]
Seeking advice or information.	Those creating posts were looking to gain something through explicit or implicit use of questions.	[Does anyone know of a direct drill contractor in the Blackpool area who is decent? Thanks]
The place of farming in society.	Those creating posts explored without questioning, the place of farming and farmers alongside other members or groups of society, how farmers balanced farming life alongside other employment and farming life, as well as how farming life had changed in recent years.	[Governments want lower food prices, before this can happen people need to work out what their priorities are; luxuries and mobile phones are not essential for life in the same way that food is]

Table 5

Overarching themes within reply posts.

Overarching Theme	Description	Example Quote
Closing down the discussion.	Reply posts constricting discussions; forum moderators closing threads, reply posts from initial posters implying the goal of the thread had been achieved, and reply posts where an individual rejected or dismissed previous replies or initial posts.	[Thank you for all the sensible replies] [Just stop posting on the forum, or going on the forum]
Non-definable effect on the discussion.	Reply posts where it was not possible to establish the impact on the thread, resulting often from reply posts containing (only) images or emoticons, sarcasm or jokes.	[put some oinkment on the pig]
Broadening the discussion with explicit links to personal experience.	Reply posts which built on the discussion within the thread, adding content and leading to or encouraging further replies with explicit links to personal experience.	[we have called the vet out in the past for our adult tusked boar who developed an abscess]
Broadening the discussion without explicit links to personal experience.	Reply posts which built on the discussion within the thread, adding content and leading to or encouraging further replies without explicit links to personal experience.	[you could always contact Smith's farm in Devon, they might be able to offer accommodation and a job position]

3.4. Suicidal thoughts thread

At the point of data analysis this single discussion thread had received over 11,000 replies and had been viewed over 1,000,000 times, appearing to have received reply posts almost daily over the time it had been present on the forum. The first 500 reply posts from the suicidal thoughts thread were categorized for forum participant behavior (Table 6), sentiment (Fig. 2) and analyzed using reflexive thematic analysis which resulted in five overarching themes; (1) farming as a challenging profession, (2) the role of isolation, (3) benefits of informal support networks such as TFF, (4) sharing personal experiences, and (5) the need to support each other (Table 7);

4. Discussion

This research study explored the peer-to-peer interactions occurring within an online agriculturally focused forum by collecting data from initial posts and reply posts across varied topic forums and a specific 'suicidal thoughts' thread, allowing for a critical examination of its' potential as a space to support farmer well-being. Some components resulting from the analysis related to functionality features of online forums in general, and were unlikely isolated to TFF, whilst others arose from the peer-to-peer interactions contained within. The components were grouped into strengths and risks for well-being of the forum, as well as potential opportunities of the forum moving forwards, presented below and discussed in line with existing research.

Whilst creation of a user profile allowed farmers to raise personal challenges and ask questions anonymously (posting behind usernames),

Table 6

Forum participant behavior within suicidal thoughts thread.

Type of Post	Explanation	Occurrence	Example Quote
Directional support reply	Reply post gave explicit recommendations.	95 instances (19 %)	[try not to give up on taking medicine, you will find some types that don't work whilst others may, you just need to find the best ones]
Non-directional support reply	Reply post shared personal experiences.	205 reply posts (41 %)	[A friend who I won't name took his own life as a result of being pressurized into taking on the farm and its large debts, he wanted to go his own way away from farming as he didn't like farming, but couldn't]
Relevance- Positive	Relevant reply given.	376 reply posts (75.2 %)	The thought has gone through my own mind, this year in fact]
Relevance- Negative	Irrelevant reply given.	124 reply posts (24.8 %)	[I would not have imagined dentistry to be a stressful job]
Novelty- Positive	Provision of new ideas.	53 reply posts (10.6 %)	[there is lots of support out there, start with your GP]
Novelty- Negative	Provision of repeated ideas.	104 reply posts (20.8 %)	[You can call FCN from 7am to 11pm each day to discuss things] [Farm Crisis Network?]
Practical Utility- Positive	Practical solution provided.	152 reply posts (30.4 %)	[try calling the FCN network, their phone lines are open from 7am to 11pm each day so there is always someone there to talk through things with]
Practical Utility- Negative	Impractical solution provided.	0 reply posts (0 %)	

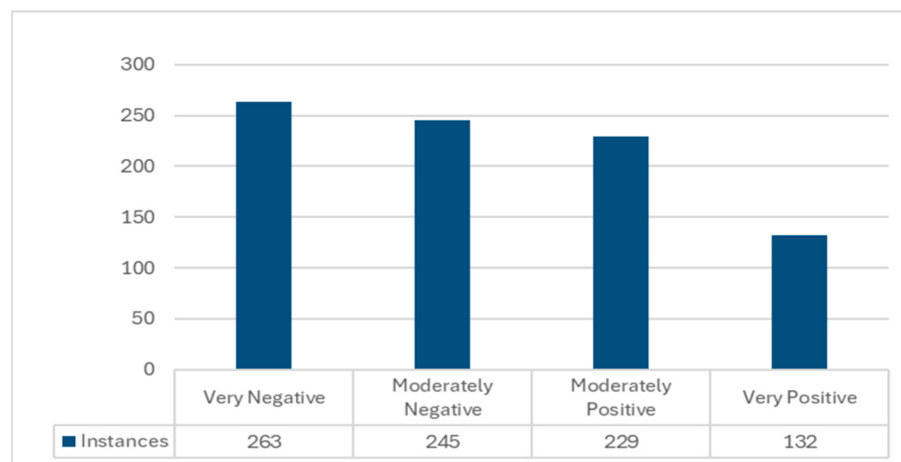


Fig. 2. Sentiment analysis within suicidal thoughts thread.

Table 7

Overarching themes within suicidal thoughts thread.

Overarching Theme	Example Quote
Farming as a challenging profession.	[lots of bills this week, prices for grain, potatoes and beef are all uncertain]
The role of isolation.	[suicide in farming is likely caused by isolation and a desire to maintain machoism]
Benefits of informal support networks such as TFF.	[this thread is great and the forum itself is inclusive]
Sharing personal experiences.	[I lost my son to suicide last year and it was the worst day of my life]
The need to support each other.	[It is always worth speaking to someone, I know that myself and others on this forum would be willing to talk or listen if anyone would like to send a private message]

for some, disclosure of information increased the likelihood of them being known to others, especially when working in a less typical enterprise or within local supply chains. In many instances, disclosure of identifying information could be down to the individual posting, with no obligation to do so, but at times the information of others was also brought into the discussion threads implicitly or explicitly. Whilst these comments increased discussion thread content, the sharing of information about an individual who has not consented could be considered a challenge, especially if it resulted in their becoming known to others. Neither of these challenges are isolated to TFF but are more likely to be challenges of online forums in general.

TFF saw the sharing of lived experiences from farmers across the UK and beyond, offering diverse information to discussion threads that appeared to have been gained from many years of farming and suggesting the forum as a place for sharing experiential knowledge from across time and space. The sharing of lived experiences could be considered a strength of TFF although there is potential for some to become reliant on the experiences of others. Whilst this forum may provide information tailored to an individuals' needs, presented in a readily available format, reliance may mean individuals do not explore scientifically evidenced information, or information that would be better positioned by professionals (e.g., their GP or bank manager). These findings focus on technical outcomes of peer-to-peer interactions on forums and if individuals are offered sound advice on forums rather than TFF's support potential and introduces the opportunity to involve industry or non-industry experts within discussion forums. Involvement from those working alongside farmers or in other professions may support the well-being of those using TFF, ensuring current, reliable and sensible information around topics such as farm audits, animal nutrition, and even human health.

4.1. The Farming Forum as a space for supporting farmer well-being

TFF retains an agricultural focus, offering overarching and specific topic forums with thousands of active discussion threads and hundreds of thousands of reply posts. Search functions on the forum offer keyword searches, enabling farmers and site visitors to locate discussion threads around a topic of interest (it is also possible to search for posts made by specific users), likely resulting in some not needing to start new threads, should a relevant thread already exist and acting as an information repository for UK farmers based heavily on lived experiences.

Threads on TFF are constantly active, allowing individuals to move through, read and reply at will (site visitors can view threads but cannot post replies) with the forum accessible 24 h a day, seven days a week. Constant accessibility of online forums has been suggested to be beneficial (Kilpatrick et al., 2023), allowing individuals to create, read or reply to posts at any time of day or night and enabling questions or concerns to be addressed as they arise, preventing an individual dwelling on something which can contribute to feelings of depression and anxiety (Ehring and Watkins, 2008). With exposure to long working hours and social isolation suggested to impact well-being negatively (Fraser et al., 2005; Gregoire, 2002; Hansen et al., 2020; Sabillón), the ability to access TFF at any time is helpful, especially for those who may have limited real-life social support, which has been shown to be a contributing factor of farmer suicide (Gregoire, 2002; Perceval et al., 2018). There remains potential for excessive dependency on TFF, as can be seen on other online forums (Lawlor and Kirakowski, 2014) in relation to creating initial posts or replying within threads with posts from some users encountered many times during data extraction and TFF user data showing some (non-moderators) to have made over 50,000 posts (including initial posts and reply posts).

Farmers use social media platforms to present themselves, their lives and their places to other social media users (DeVito et al., 2017) with research by Riley and Robertson (2021) finding some farmers used Twitter (renamed 'X' in 2023) to communicate their day to day lives through 'working out loud' (the "process of narrating work during the

course of its' realization" (Sergi and Bonneau, 2016 p.378), something which does not appear to occur on TFF with under 5 % of initial posts dedicated to sharing personal information. On mainstream social media platforms, posting pictures and text can provide information to the masses and has shown distinction between farming and non-farming occupations and increased public awareness of farming life (Riley and Robertson, 2022). The lack of initial posts on TFF sharing personal information without also seeking advice or information (classified as non-directional initial posts) may result from awareness that many other TFF users are also farmers and therefore, unless something out of the ordinary occurs, there is little need to use the forum to comment on daily activities and potentially puts farmers under less pressure to present themselves or behave in a particular, socially constructed way.

Whilst a few initial posts shared only personal farming experiences, farmers used the forum to discuss agriculture generally, appraising the future of agriculture and the place of farming in society. Fear of pressure from activists, climate change, loss of biodiversity and land conversion have been highlighted as concerns of farmers (Ceccato et al., 2021; Herzon and Mikk, 2007; Lund and Olsson, 2006; Shortland et al., 2022). Within TFF, however, farmers appeared less fearful and more unsure of how to meet consumer, government and supply chain expectations with challenging times ahead posed by mainstream media. Many held concern over receiving the blame for things out of their control and used TFF as a space to discuss thoughts with others in similar positions.

To post on TFF, an individual must create a personal profile containing basic information (username, individual role and location) although only an individual's email address is verified and is not publicly available. Some use what appear to be real names as usernames, whilst others refer to themselves by pseudonyms and whilst some share their location and role, others do not. Kruger (2016) suggests pseudonym use on online forums can say something about the one who makes them and how they want others to see them; on TFF many usernames refer to aspects of farming life (e.g. livestock breeds) implying some use their username to provide information about their occupation or seek a username that holds agricultural links. Verification of the identity someone presents does not occur on TFF and there is the potential that someone self-declaring as a potato farmer from Kent may not be, although in the instance that someone does not comply with forum rules (e.g. uses a socially inappropriate username) their account may be removed. White et al. (2014) suggest there is little difficulty in lying on social media platforms where individuals want to be approved of by others (Rudolph et al., 2005), this could be less likely to occur on TFF where users use the site to ask questions, gain advice or circulate information, rather than present themselves, their skills or their role within the industry.

Existing research on farmer peer-to-peer interactions focuses on discussion of topics such as agricultural technologies, product yield, and regenerative agriculture (Jiménez, 2023; Nyambo et al., 2020; Sutherland and Marchand, 2021). This research study explored naturally occurring conversations across a range of agricultural topics, finding many used the forum to check existing knowledge or seek guidance on fundamental farming tasks or everyday livestock management. Individuals turn to others in situations of uncertainty (Jucks and Thon, 2017) and whilst a single trustworthy source is sufficient to create validation, so is agreement by the masses (Jessen and Jørgensen, 2012), explaining why individuals may use TFF to ask questions or check existing knowledge before, after or rather than completing independent research or speaking to industry experts (which may also come with time and financial implications). In response, TFF users often received a high number of solutions from others in replies, although many of these were repeated solutions. Repeated replies may validate the thoughts of the initial poster or an earlier reply and were often supported with additional information, broadening discussions and implying peer-to-peer interactions stemming from initial posts seeking advice or providing information were deemed valuable to users.

Provision of repeated ideas or comments in reply posts suggests TFF

users may feel obliged to participate actively in discussion threads; repeating comments already given rather than seeing an already provided suitable reply post and moving on. Whilst this action likely benefits the one making the initial post (and others passively involved) through validating previous comments (Jessen and Jørgensen, 2012), it may add pressure to users who over time have shown themselves to hold a presence on TFF. Brozzo and Michael (2023) found commenting on social media posts could create a sense of commitment for an individual to comment on future posts with concern over perceptions of others should they stop, potentially impacting well-being. Obligations to offer reply posts are likely reinforced by TFF users who tag individuals in discussion threads although whilst this may pressurize forum involvement, it may be received positively with those tagged viewed by others as experts on a topic or in a strong position to offer insight to a comment which had been raised.

Whilst the suicidal thoughts forum saw no impractical solutions, it received limited variation in practical solutions; those given including contacting GP's, helplines, or those surrounding farmers, each repeated multiple times. Repeated references were made to the value of informal networks and the role of peers in supporting farmers either online or in real-life and indicated awareness of the benefits for individual well-being which could be gained from peer-to-peer interactions. Consistently offered practical solutions may have resulted from the initial post not being posted by a forum user seeking specific information or advice, instead posed by a TFF moderator who offered the thread as a place for discussion. Reply posts in this thread rarely linked directly to content posed in the initial post (two questions posed around available support), instead related to already existing reply posts or introduced new content. Where practical solutions were offered, they were in response to content raised by others. Reply posts showed understanding of the challenges of farming life with a focus on isolation and the lived experiences of those who had experience of suicidal behaviors. Although a few callous remarks could be seen, these were opposed in subsequent replies as individuals looked to support each other and highlighted their own thoughts around this topic, expressing explicit links to individual well-being found rarely across other TFF discussion threads.

Several topic areas previously evidenced to be areas of concern for farmers were found across TFF topic forums, including chronic livestock health challenges, rural crime, weather disruptions, agricultural and everyday technologies, family conflict and COVID-19 (Crimes and Enticott, 2019; Lobley et al., 2004; Rose et al., 2023a,b; Russell et al., 2023; Smith, 2020; TePoel et al., 2017) suggesting that whilst farmers have disclosed these as concerns to academic researchers, those working alongside them and professional services, they continue to discuss them with those around them in public spaces such as online forums. Discussion of topics highlighted in the research literature influencing farmer well-being indicates TFF is a space farmers feel they can hold relevant discussions, with likely positive impacts on well-being if support can be obtained. Nevertheless, in many instances explicit links between topic and well-being were not present, instead topics were posed as questions or statements, suggesting that on agricultural forums despite being surrounded by like-minded individuals, farmers may remain stoic in nature. Some TFF users referred to other forum users as “the collective” (or similar) when seeking information, implying they saw value in sharing their situation, especially regarding farm audits and paperwork where reference to individual well-being could occasionally be seen with the use of terms such as ‘feeling stressed’ and ‘unsure what to do’. With many farmers experiencing these aspects of farming life, forum users appeared less conscious of admitting impacts. This is likely supported by discussion of these topics on mainstream media such as BBC News (Jenkins and Stone, 2024) but may leave individuals less willing to explicitly discuss well-being in relation to topics they felt they faced in isolation, less influenced on their well-being or topics which are less publicly discussed.

Study findings suggested where initial posts were posed directionally, that those replying considered solutions which could be suitable for

the initial poster, providing these within reply posts with less than 1 % giving an impractical solution Research examining online support forums highlights that alongside encouragement towards behaviors which may aid an individual, maladaptive behavior encouragement can often be found (Davis and Lewis, 2018; Ransom et al., 2010) and may have negative well-being impacts. TFF reply posts were taken at face value and it appeared likely some giving impractical solutions likely posed these humorously rather than maliciously (Table 5). Whilst there remains the potential of negative impacts on the original poster from these comments (should they be taken at face value) it is not deemed a weakness of TFF with the use of humor in online forums previously shown to be a way of coping with illnesses that would not be seen offline (Demjén, 2016) and relieving tension (Lee, 2005). The provision of an impractical, potentially humorous solution within TFF reply posts was categorized as having no definable effect on the discussion due to uncertainty over how the reply may be received by others, although was often followed by further similar reply posts and accompanied by ‘ha-ha’ reactions or emojis, supporting that these peer-to-peer interactions could indicate the presence of social relationships and support community building (Marone, 2015), an area also worthy of further exploration.

Whilst the suicidal thoughts forum saw TFF users discussing lived experiences of suicidal behaviors, the presence of lived experiences was apparent across all topic forums. Farm decision making is complex, affected by role and experiences (Hayden et al., 2021) with individuals likely to seek the experience of others when facing unfamiliar situations (Entwistle et al., 2011). Use of TFF as a space to seek experiences from others was unsurprising and supported that peer validation can be seen as being as valuable as expert support (Jucks and Thon, 2017) and that experience sharing amongst farmers influences decision making (Marra et al., 2003). Research suggests differences in how farmers and scientists understand farming practices with a need for knowledge which links to place and has developed in context (Thomas et al., 2020), something available on TFF where those replying to initial posts often indicated themselves to be a similar position to the one making the initial post. Occupational similarities shared between TFF users may also encourage the returning of users to the forum at later dates, to create further initial posts or add content to existing discussion threads, with research suggesting individuals more likely to trust and continue to associate with those they deem similar to themselves (Christakis and Fowler, 2014; Clerke and Heerey, 2021).

Wójcik et al. (2019) acknowledge farmers gain knowledge through experience arising from years of collaboration between a person and a space, which they can share with others. This supports research by Rust et al. (2021) who suggest farmers are more likely to rely on peer networks than traditional experts, as well as the findings in this study which indicated farmers turn to TFF in order to gain the experiences of others. Whilst use of TFF and peer-to-peer interactions contained within functions as an information source and could be deemed a strength of the forum, there is potential that some may overlook evidence-based science in favor of the personal opinions of TFF peers. Farming organizations and researchers challenge negatively posed misinformation online (AHDB, 2023; Chowdhury et al., 2023) but their scope does not reach into online forums, and whilst some TFF users direct others to public sources of information, most information appears to come from experience alone with potential risks for others following advice if they do not have full information or are working within different parameters. The potential opportunity for TFF to invite researchers or those working professionally within the agricultural industry (aside from farmers) to participate within discussion threads to support provision of evidenced based information is something that has proven beneficial within online health community forums (Atanasova et al., 2017). There is awareness that whilst this may be supportive for some, involvement of industry experts within TFF could move the forum away from being a space where farmers are able to hold discussions about any topic with other farmers, away from intentionally placed industry actors, and therefore

does require more investigation.

Farmer experience sharing occurs in places farmers socialize (Fayssie et al., 2012) indicating TFF could be seen as a space for gaining knowledge and socializing or that sharing experiences is deemed a part of socializing. The forum has benefit in information sharing with users located across the UK (and beyond), although with different landscapes, farming systems and weather conditions there is potential that experiences of one may not mirror those of another. TFF allows regular interaction between farmers, offering a first point of contact when challenges or questions arise (Klerkx and Proctor (2013) found farmers first turn to peer networks to seek information), and may offer information to those beyond the one making an initial post with no discussion threads examined having not received any views. Over a third of TFF reply posts contained non-directional support through experience sharing, confirming that many replying saw a need to provide experiences to aid the one posting or to provide additional information to the discussion thread (although at times not all experiences shared were categorized as relevant). This further supports the value in experience sharing, which can aid the development of social bonds between individuals (Jolly et al., 2019).

Tangents (topic drift) within discussion threads is deemed a challenge of TFF as a space for supporting well-being as it is not apparent the impact these could have on the well-being of those posting or future forum engagement. It was not clear if topic drift began intentionally (users intending to change the topic of conversation) or unintentionally (due to misinterpretation of previous comments) and appears a common challenge surrounding social media and online forum communications (Mullick et al., 2018; Park et al., 2016). Topic drift can hinder social interactions on online forums and lead to feelings of frustration although can also follow a natural course of conversation and bring in new information (Mullick et al., 2018) with Park et al. (2016) finding topic drift on health forums to occur either rapidly (conversations “hijacked” (p.7)) or more slowly (topics going “off-topic” (p.7)) later counteracted either by forum moderators or forum users in subsequent reply posts.

Whilst reply posts brought information and experiences from TFF users, at times experiences belonged to those outside of TFF, moved into discussion threads by TFF users from external peer-to-peer interactions. Whilst this supports that many users have social networks beyond the forum and increased forum content, it leads to questions around how those included without their knowledge may respond to their information being shared. Discussion of others within reply posts often remained surface level, their experiences with the topic raised in the initial post allowing farmers to reply when they themselves may not have had their own personal experience. In some instances, information about others brought into reply posts did contain personal information although in these instances the aim did not appear to be to ‘name and shame’ others but provide information that supported the discussion thread.

Information sharing is the focus of social media platforms, and many users are not concerned about security and privacy (Baracaldo et al., 2011; Miller and Voas, 2012), openly sharing personal identifiers (Chan and Virkki, 2014) despite this information then becoming available to any number of others. Whilst sharing one's personal information could be seen as being the decision of the one sharing with consequences falling on them alone, people do share information about others online. Chan and Virkki (2014) found many social media users willing to share information about others and not feeling the need to ask individuals for their permission before sharing their information. This suggests that on TFF those being spoken about by others may not be aware that their personal information has reached an online forum or is now publicly accessible through internet search engines, although in many instances, explicitly identifiable features around those discussed are not provided.

The close-knit nature of rural communities was commented on positively by Harley et al., (2018) when examining resilience, although Shortland et al. (2022) found farmers held concerns about the closeness of communities when sharing personal information. Findings from this research study demonstrate that despite the creation of a personal

profile that may not contain any identifying information, the information a user shares about themselves or others can lead to their identity being publicly revealed. Whilst TFF is considered a public platform and posts can be located through internet search engines, findings suggested some forum users saw it as a private area, disclosing comments which they may not have shared on more obviously public facing platforms such as Facebook or Instagram, although without direct discussion with forum users this cannot be confirmed. Initial posts seeking advice around medical issues often gave explicit detail around symptoms and within both initial posts and reply posts, forum users referred to family conflicts or disagreements that seemed unlikely to have been discussed publicly on other social media platforms. The perception of privacy within TFF was possibly aided by feelings of an invisible audience (Pötzsch et al., 2010) due to interactions taking place online or assumptions that those not associated with the forum were unlikely to view comments, but does raise concerns over well-being impacts that could arise should comments be viewed by others known to the one posting.

Self-disclosing information online can see an individual more likely to be noticed by others with those withholding information appearing less trustworthy (John et al., 2016), although it can increase vulnerability (De Souza and Dick, 2009). On TFF there were instances where users remembered previous posts where individuals disclosed relevant information and pulled this information into new discussion threads, suggesting peer-to-peer interactions occurring on TFF are remembered, built on more than single stand-alone interactions. Rurality is linked to the high degree of familiarity among people living in a small place (Haugen and Brandth, 2015) where it is presumed that everyone knows everything about everybody. This transparency in small communities can regulate individual behavior, leading to conformity or compliance with prevailing behavioral norms (Haugen and Brandth, 2015) and whilst the anonymity of TFF likely offers some protection against an individual's true identity being found, a high degree of familiarity between users is apparent even if it is based only on the information gathered from the forum.

Farming as a sector has challenges around the stigma attached to mental health, seeking help and expressing feelings and emotions. This was apparent within TFF topic thread discussions studied where farmers casually discussed challenges and concerns which at times appeared to threaten the future of their enterprise or saw lives lost or property damaged, often with humor or personal reflections that did not express emotion. This research study has shown TFF to be a space where users can raise concerns anonymously around a range of topics within the broad area of agriculture. The focus of many discussion threads appears to be the desire to seek the lived experiences of other farmers and to confirm or share the thoughts of the one posting. Identifiable features of user profiles and post content suggests the close-knit nature of rural communities may still be found online. Regardless of whether users are known to each other in real life, the online community appears to offer each other support by sharing of personal experience or relevant information and advice through peer-to-peer interactions and likely compliments real life peer-to-peer interactions, in turn potentially supporting farmer well-being.

Sentiment analysis of initial posts and reply posts showed bias towards negative language use, supporting previous research which suggests individuals are more likely to use online forums to present negative comments (Watson et al., 2024; Zhang et al., 2024). Whilst some use TFF to circulate available information relevant to the industry rather than their own challenges, the language used across the forum remained generally more negative than positive although this may result also from the sharing of negative news-related social media posts. The ability to express negative comments or emotions on TFF may prevent a user from ruminating on negative thoughts. This has been shown to be a behavior which can reduce depressive symptoms (Gortner et al., 2006) which could be especially valuable for farmers who may spend a large proportion of their day alone, posing TFF as a space to leave their thoughts

and move on with their daily activities, aided by increasing broadband availability in rural areas (NFU, 2023).

Whilst antisocial behavior is suggested to be common in online public discussions (Cheng et al., 2017, 2021) it appeared rarely on TFF in the study period, although it is acknowledged that not all discussion threads were examined. The lack of antisocial behavior and focus towards supporting others may be because those using the TFF seek support and advice, and not conflict, or the rapid removal of such individuals from the forum as per TFF forum terms and rules, allowing discussion of a range of topics even if not all agree with or support comments raised. A strength lies in the forum's ability to host multiple discussion threads concurrently where farmers can gain responses from others who may hold different views or experiences of the topic raised, bringing these to a central location and leaving them available to be viewed by others who search for specific information on the forum.

Explicit links between discussion thread topics and farmer well-being were generally uncommon, however, the presence of the suicidal thoughts thread showed that when a space was available to draw on explicit links between farming life and well-being, mental health and suicidal behaviours, such discussions did occur. Whilst there are grounds for concern surrounding the validity of information provided by farmers within discussion threads which may not be scientifically evidenced, the peer-to-peer interactions appear supportive. Information is being shared because users want to support those who may be unsure or unaware, and by replying, users are by default being supportive, a process which likely has well-being impacts for all farmers involved.

5. Conclusion

Concerns around low levels of individual well-being within farming has led to research exploring associated factors, consequences and potential support opportunities. This research study explored the potential of an online agriculturally focused forum (TFF) as a space for supporting farmer well-being, and at the time of data collection appeared to be the first study to consider the potential for well-being support to be gained from a general agricultural online forum. Analysis of initial posts and reply posts across 12 topic forums and a specific suicidal thoughts discussion thread demonstrated the potential of the forum to support farmer well-being; farmers used the forum to seek information or guidance and in response gained advice from others, often in the form of experiential knowledge and lived experiences. More explicit references to individual well-being were limited outside of a specific suicidal thoughts discussion thread, although the presence of these discussions indicated that when a space to share such thoughts exists, it was utilized. Limitations around the forums ability to professionally support farmer well-being due to the potential for negative remarks, disagreements between users and the possibility of identifying information being shared warrants further exploration but could be overcome with forum management and the inclusion of professional individuals, although this may impact the casual and open nature of how users communicate. TFF offers farmers an opportunity to interact with like-minded individuals with probable well-being impacts, and this research study provides a starting point for future research into how a farmers' landscape of support may reach beyond those individuals with which a farmer interacts in person and into their interactions within a virtual space.

CRedit authorship contribution statement

Jennifer Howse: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. **David Rose:** Conceptualization, Supervision, Writing – review & editing. **Katharina Watson:** Conceptualization, Supervision, Writing – review & editing. **Damian Maye:** Conceptualization, Supervision, Writing – review & editing. **Lisa Morgans:** Conceptualization, Supervision, Writing – review & editing.

Declaration of competing interest

We have no conflicts of interest to disclose.

Data availability

The data that has been used is confidential.

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