



From posts to practice: Instagram's role in veterinary dairy cow nutrition education—How does the audience interact and apply knowledge? A survey study

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ABSTRACT

This study evaluates Instagram's efficacy as an educational tool in veterinary sciences, focusing on dairy cow nutrition and management. Using the Instagram account "Stalla Didattica Unibo," established in December 2020, a survey was conducted with 102 respondents, primarily consisting of university students (44.12%). The respondents were divided into 2 major groups: students and the general population, with the latter comprising professionals and others not currently in educational programs. In the overall population, the age group of 25 to 34 yr accounted for 51%, but among students, it was 73.3%. In terms of gender distribution, there was a female majority in the general population (59.8%) and a male majority among students (73.3%). Most responders were from Italy, with Emilia-Romagna contributing significantly. Engagement was measured not only by the length of time participants followed the account but also by active interactions such as likes, comments, and shares. Among the total population, 47.1% had followed the page for over a year, compared with 37.8% of students. Importantly, engagement metrics showed active participation, with a majority reporting improved knowledge (75.6% of the total population and 74.5% of students) and practical application of content (64.4% of the total population and 67.6% of students). Content preferences varied, with the general population favoring quizzes (33.3%) and stories (17.8%), whereas students showed a stronger preference for standard posts (36.3%). Impact was defined as the perceived influence of the Instagram content on the respondents' learning and professional practices, with 46.7% of the total population and 52.9% of students agreeing or strongly agreeing that the page had a positive impact on their knowledge and practical

skills. Furthermore, 84.3% of students and 77.8% of the total population stated they would recommend the page to others, underscoring the account's effectiveness as a digital educational tool. The study highlights Instagram's potential to enhance veterinary education and suggests further research to explore the broader application of these strategies across different educational contexts and platforms.

Key words: Instagram, veterinary education, social media learning, digital education tools

INTRODUCTION

Over the last years, veterinary medical students have been using social media platforms extensively for educational purposes (Muca et al., 2022). Social media platforms, with their diverse methods of communication and collaboration opportunities, offer unique advantages for both formal and informal learning (Findyartini et al., 2024). Among these platforms, Instagram stands out due to its visually oriented format, making it a particular tool in fields where visual and interactive content can significantly enhance the learning experience (Carpenter et al., 2020; Gulati et al., 2020). The platform's ability to facilitate quick sharing of images and information makes it an excellent tool for educational outreach and community engagement (Koenig et al., 2021; Bhatia et al., 2022). Since the onset of the COVID-19 pandemic, the reliance on digital platforms for educational purposes has increased significantly (Nisar et al., 2022). Institutions and educators have increasingly turned to social media to bridge the gap between traditional learning environments and remote education (Papademetriou et al., 2022). Students and educational institutions are using Instagram more frequently than ever before. Instagram is popular among younger groups (Coman et al., 2021). This rise is attributed to its simple interface and the engaging nature of its content, which are ideal for the dynamic communication needs of today's digital learners (Muca et al., 2023a).

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The list of standard abbreviations for JDS is available at adsa.org/jds-abbreviations-24. Nonstandard abbreviations are available in the Notes.

Despite its growing integration in educational fields, how users perceive and use Instagram for learning, particularly in specialized fields such as dairy cow nutrition and management (Magro et al., 2024), remains largely unexplored. A key component of veterinary education is the teaching of animal nutrition, especially as it relates to dairy cattle. Lectures, hands-on laboratory exercises, and guided tours of cattle farms are the standard teaching modalities used in animal nutrition courses in Italy (Schuenemann et al., 2011). These methods give students the practical know-how and strong theoretical groundwork they need to meet the issues facing the livestock industry (Trittmacher et al., 2021). Education professionals, students, and livestock producers rely heavily on the information and updates published in specialized journals (Buonaiuto et al., 2021; Cavallini et al., 2021a; Heinrichs et al., 2021).

These periodicals ensure that all stakeholders are informed and up to date by providing the most recent research findings, industry trends, and best practices (Ferlizza et al., 2020; Cavallini et al., 2023; Dini et al., 2024; Masebo et al., 2024). Through a combination of formal education, workshops, on-the-job training, and continual professional development programs, livestock producers frequently receive training and updates. By giving farmers up-to-date information on the most recent developments in animal nutrition (Zuidhof, 2020; Chase and Fortina, 2023) and livestock management (Zhao et al., 2019; Wei et al., 2023), agricultural extension services from government and academic institutions also contribute significantly to farmer education (Reddy and Kumar, 2020; Cavallini et al., 2021b; Felini et al., 2024). In contrast, the advent and growing diffusion of social networks are transforming the educational landscape globally. Social media platforms provide new ways to enhance conventional teaching strategies by encouraging communication between educators and students, exchanging educational materials, and establishing online learning communities. Investigating how to modify animal nutrition courses to leverage social networks for the purpose of enhancing student learning and instructional efficacy is imperative. Furthermore, combining data from specialized scientific journals with social media platforms could improve the educational process even more and ensure that everyone involved is aware of the most recent advancements in the industry (Baillie et al., 2011). Therefore, the present study seeks, first, to evaluate the effectiveness of Instagram as an educational tool specifically tailored for veterinary sciences, focusing on dairy cow nutrition and, second, to assess how the page influences user engagement and interaction, particularly observing at how followers perceive and apply the educational content provided through the selected social media platform. By analyzing

these aspects, the present study seeks to understand the effect of tailored educational content delivered via Instagram on both knowledge enhancement and practical application among its audience. The significance of this research lies in its potential to contribute to the evolving field of digital education methods. This study explores the effect of Instagram on followers' knowledge of dairy cow management and nutrition, patterns of engagement across demographics, and the practical application of content learned. These findings can inform future strategies for integrating social media into professional and academic training.

MATERIALS AND METHODS

Instagram Page Overview

In December 2020, the Dairy Cow Nutrition University Farm (Ozzano dell'Emilia, Bologna, Italy), a well-established educational facility run by a team of experienced professionals in the field of animal science, created an Instagram account (stalladidattica_unibo; https://www.instagram.com/stalladidattica_unibo). The farm is part of the University of Bologna and is known for its hands-on approach to teaching and research in dairy cow nutrition and management. This digital initiative was designed to modernize and enhance the educational outreach of the department, leveraging social media to bridge the gap between theoretical knowledge and practical application in these fields (see Figure 1). By sharing daily farm activities, research insights, and expert advice, the account has become a credible source of information for both students and professionals in the industry.

The primary target audience of this study included veterinary students and practicing veterinarians, as well as other professionals in the veterinary and agricultural industries, such as farmers and those involved in dairy cow management. Although the Instagram account "Stalla Didattica Unibo" primarily aims to enhance the education of veterinary students, it also serves as a resource for practicing veterinarians and industry professionals, offering practical insights that can be applied in real-world scenarios.

Our main objective with social media outreach is to highlight the significance of dietary habits and management measures that are supported by science by using a combination of engaging and informative content. We post a range of content on our Instagram feed with the goal of educating and entertaining veterinary professionals, students, and followers of dairy farming. One of the effective tactics we have employed is the "Know Your Feed" series, offering comprehensive insights into various cattle feed varieties, their nutritional makeup, and optimal feed management techniques. Our Instagram en-

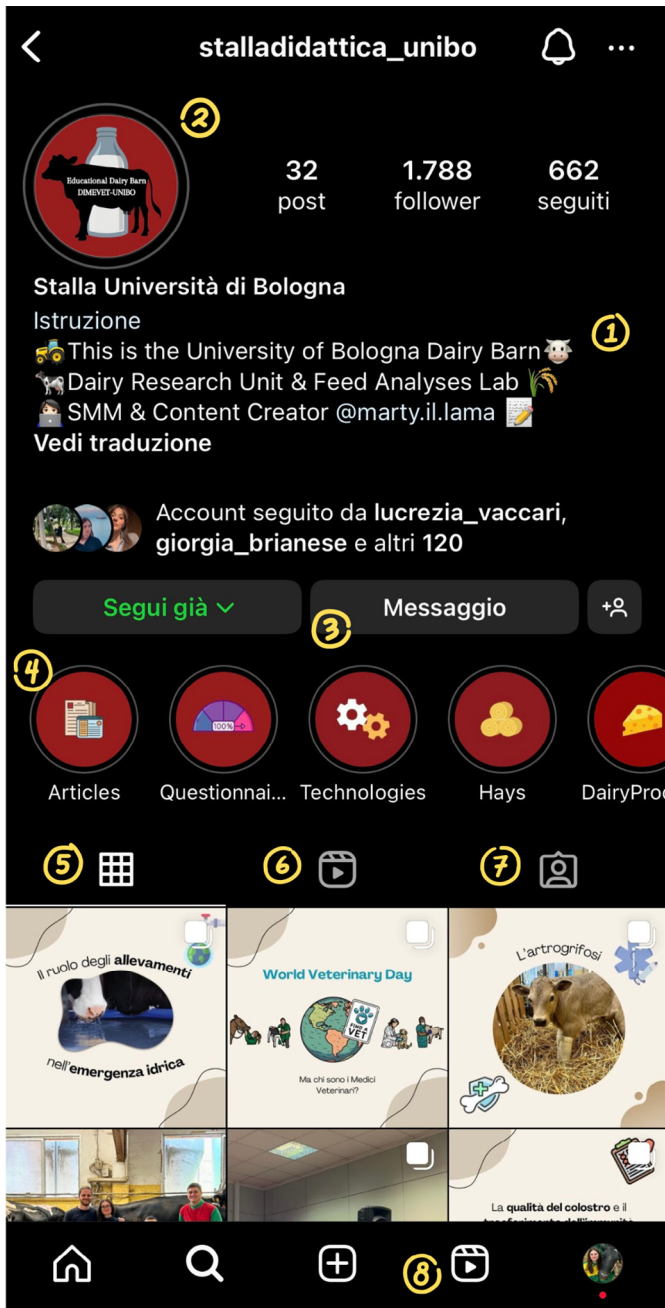


Figure 1. Overview of the “Stalla Didattica Unibo” Instagram page. Biography: describes our department’s vision, goals, and expertise; stories: provide simple information on dairy cow nutrition and management; direct messaging: facilitates discussions and answering questions; contact information: included in the biography for collaborations and resource sharing; highlighted stories: selected stories lasting beyond the usual 24-h timeframe, creating a content repository; post feed: provides a variety of educational content related to dairy cow nutrition and management; IGTV: shares in-depth video content for an all-around learning experience; tagged posts: promote community interaction by recognizing and reposting tagged posts; reels: deliver short videos on a wide range of instructional topics. (1) Instagram account and biography, (2) stories, (3) messaging, (4) highlighted stories where those we do not want to disappear after 24 h are collected, (5) main page with all posts, (6) Instagram TV, (7) posts in which we are tagged, and (8) reels (adapted from Muca et al., 2023a).

agement has demonstrated substantial growth since the launch of our educational series. Engagement, measured by metrics such as follower growth, post frequency, comments, overall reach, likes, shares, and saves, has significantly improved. For example, our followers grew from 0 in December 2020 to 1,854 by September 30, 2024, and we currently post an average of 1 to 2 times per week, with each post receiving ~5 comments. Additionally, our engagement rates, reflected by a 25% increase in likes and a 15% increase in comments per post, highlight a rise in interaction that not only validates the content’s relevance but also serves as an effective teaching tool for transferring accurate knowledge to our audience.

In addition, weekly question-and-answer sessions have been hosted, allowing us to build trust and foster a deeper connection with our audience. These sessions facilitate direct engagement and are instrumental in disseminating current research findings and practical guidelines directly applicable in veterinary practice and farm management.

Among the primary strategies that have increased interaction and expanded our reach are frequent postings, the use of interactive content such as quizzes and polls, and partnerships with other accounts that share similar interests. Since its creation in December 2020, the Instagram account has maintained a consistent posting schedule, averaging 1 to 2 posts per week. As of the moment of writing, the account has published a total of 298 posts, covering various topics related to dairy cow nutrition and management. This regular posting schedule has contributed to sustained engagement with our audience, ensuring a continuous flow of educational content. Additionally, posts that become outdated or obsolete over time are periodically archived, ensuring that the content remains relevant and up to date.

To deliver a comprehensive educational experience, our page also makes use of Instagram’s various capabilities, including stories, highlighted stories, Instagram TV (IGTV), and reels. Every feature is designed to provide a variety of material, from short instructional anecdotes to longer, in-depth talks in IGTV films.

Study Design and Participants

The current cross-sectional survey was conducted online and targeted Instagram users globally. The Instagram profile “Stalla Didattica Unibo” played a crucial role in recruiting participants, as the study focused on the followers of this page. Invitations to participate were sent out via Instagram stories over an extended period. The questionnaire was actively promoted through daily Instagram stories throughout January 2024, followed by weekly reminders from February to March 2024. The participants were surveyed only once to capture their responses at a single point in time. This approach en-

sured a diverse sample in terms of demographics and educational backgrounds.

Questionnaire Development

The questionnaire was developed after researching the existing literature to make sure it included a broad range of topics related to education and the social media use (Supplemental Material S1, see Notes). To increase participation and completion rates, particular consideration was taken to creating a short and entertaining questionnaire. Consequently, the time required to finish and submit the questionnaire was just 5 min.

The questionnaire was fully anonymous, ensuring that no personal identifiers were collected. Participant privacy and data security were given top priority by using a secure online platform that encrypted all responses. Additionally, all data were stored in compliance with General Data Protection Regulation guidelines, and access was restricted to authorized researchers only. These measures ensured that participants' privacy was protected throughout the study.

To reach a broader audience, the questionnaire was available in both English and Italian languages. Its purpose was to investigate the views and perceptions of the participants toward Instagram as a teaching and learning tool. The first part of the questionnaire aimed to collect respondents' demographic data, such as their location, gender, and age. The second part of the questionnaire was focused to collect data on participant engagement and their satisfaction with the Instagram stories learning experience. In addition, this part of the survey measured participants' perceptions of the content's applicability and practicality, as well as their views on the organization and frequency of the postings. A total of 3 open-ended questions were included in the last section of the questionnaire to measure participants' constructive feedback on possible enhancements to the instructional content.

Ethical Considerations. The first page of the questionnaire contained the request for electronic consent, where participants were given the option of completing the questionnaire or terminating the study. To agree to participate, they clicked on the "agree" button to indicate that they had read the information and voluntarily agreed to participate; otherwise, they clicked on the "disagree" button to decline participation. Participant identity was anonymous, and the data were kept on the principal investigator's personal computer using password-protected files. After consulting with the ethical committee of the Department of Veterinary Sciences at the University of Bologna, ethics approval was not deemed to be necessary because the evaluation was conducted in an anonymous manner.

Data Collection and Statistical Analysis. The questionnaire was distributed via Instagram stories daily throughout the month of January and once a week from February to March 2024. Participation in the study was entirely voluntary, and all collected data were anonymized. Informed consent was obtained electronically before the questionnaire was administered, and each participant agreed to data analysis electronically. Responses were collected over a period of 43 d between January and March 2024. All the collected data remained absolutely anonymous, and it was impossible to trace the identity of the respondents. In addition, the questionnaires were blinded before statistical analysis, which was performed on a database containing the summarized data.

Following data collection, the responses of the questionnaire were coded and entered into a customized database (Microsoft Excel 2019) and a descriptive statistic was performed, as graphical visualization of the results was performed using Canva.

RESULTS

A total of 102 respondents entirely completed the questionnaire (Supplemental Material S2, see Notes). After analyzing the data, we divided the participants into 2 major groups: the general (total) population group, comprising all 102 respondents, which includes professionals working in the field of veterinary sciences, such as practicing veterinarians, veterinary technicians, and researchers, as well as individuals with an interest in veterinary medicine and students, and the separate student subgroup, which consisted of 45 university students. This distinction allows for a more nuanced interpretation of the results, which will be discussed separately for each group in the following sections.

As shown in Figure 2a, among the total population the largest segment is the age group of 25 to 34 yr old, representing 51% of the population. The age group of 18 to 34 yr old (33.5%) and the age group of 35 to 44 yr old (6.9%) come next. In contrast, the student population is very different, with 73.3% of the total student group being in the 18 to 34 yr age range, which is representative of the average university age range. The 25 to 34 yr age group is much smaller here, at just 24.4%, and the 35+ yr age group is barely present at 2.2%.

Figure 2b shows that, among the total population, the majority were female (59.8%), followed by males 39.2%, and 1% of the participants choose to not provide information for their gender. Among the student population, 73.3% of students were males, and only 26.7% are females. The significant male dominance in this chart is notable compared with the general population.

Figure 2c shows the distribution of the participants. The majority of the population lives in Italy (96.1%),

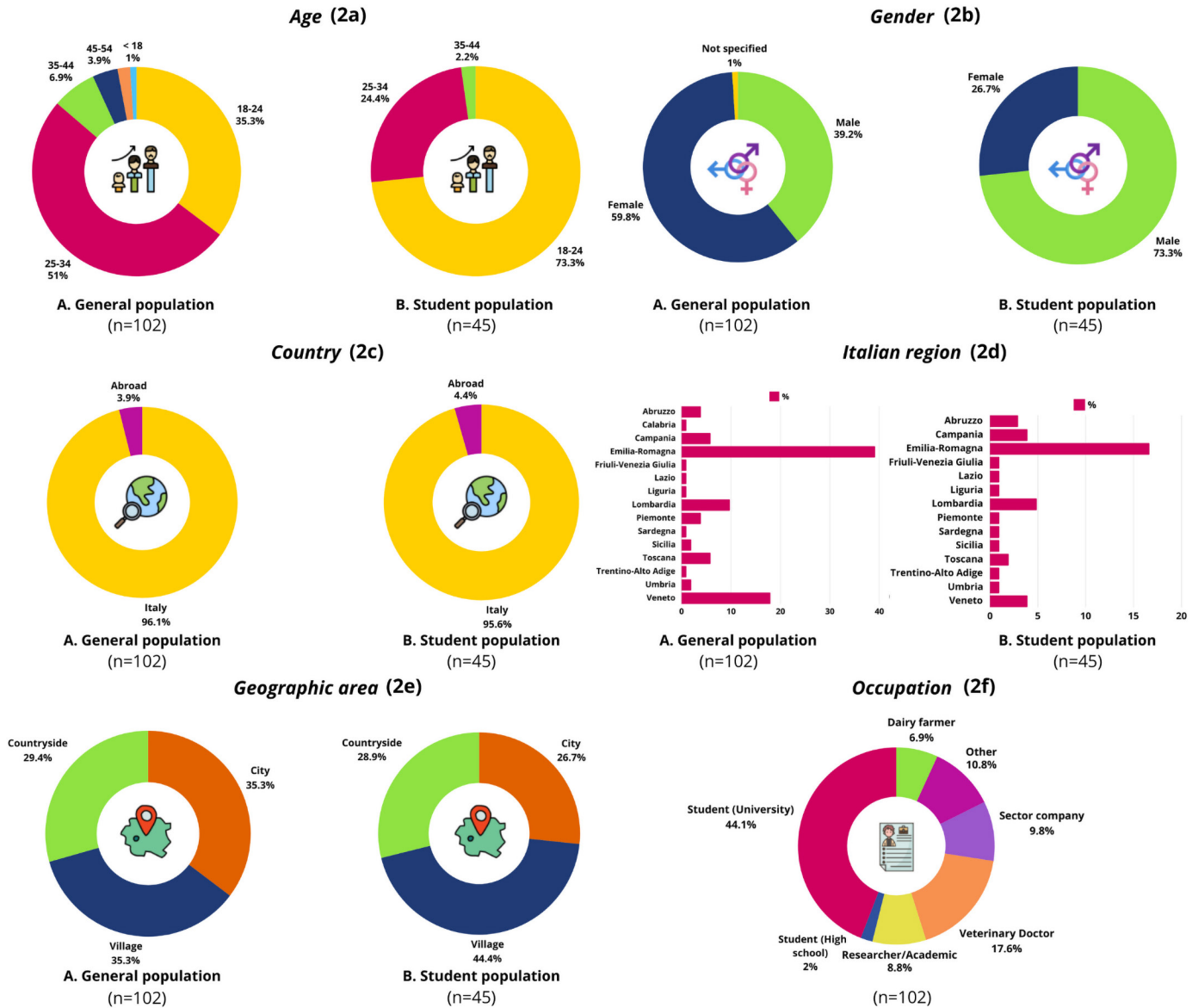


Figure 2. Graphical representation of responses provided in the survey by the general population (n = 102) and the student population (n = 45): age groups (2a), gender distribution (2b), country (2c), Italian regions of residence (2d), geographic area (urban or rural; 2e), and occupation (2f).

with a small portion living abroad (3.9%). The student population is similarly largely based in Italy (95.6%), but with a slightly higher proportion abroad (4.4%) compared with the general population. This indicates a small yet more international presence among students.

Figure 2d illustrates the distribution across Italian regions for the total population. Emilia-Romagna shows the highest percentage, indicating this region's prominence in population density or the survey's reach. Other regions with significant representation include Lombardy (Lombardia) and Tuscany (Toscana), whereas Trentino-Alto Adige and Sardinia (Sardegna) show the least representation. Emilia-Romagna still leads in the

student population distribution but with a smaller margin compared with the general population. Other regions such as Lombardy and Veneto also have noticeable representations. The distribution is more concentrated in a few regions, possibly suggesting where major universities or student populations are located.

The participants' residential distribution is shown in Figure 2e. Approximately equal proportions of the general population—35.3% each—live in cities and villages. A total of 29.4% of the general population live in rural areas, indicating a wide spread throughout different regions. Village communities are preferred by 44.4% of the students, a notably greater percentage than

the general population. Among the several areas, the percentage of residents living in cities is the lowest at 26.7%. At 29%, countryside living is comparable to that of the general population.

With 44.1% of the population being university students, this group makes up the greatest portion and indicates a strong emphasis on higher education (see Figure 2f). Veterinarians make up the second-largest category (17.6%), indicating a significant representation of this occupation in the total sample interviewed. Researchers and academics make up 8.8%, indicating a solid representation of the academic sector. Another notable segment is dairy farmers at 6.9%, pointing toward the inclusion of agricultural professionals within the population. High school students are the smallest group at 2%, which is consistent with the chart focusing primarily on working-age individuals. A total of 9.8% of all jobs fall into the "sector company" group, which could include a range of corporate or industry-specific roles. The remaining 10.8% of all jobs go into the "other" category, which includes a wide range of occupations not specifically listed in the chart.

According to Figure 3a, most people in the general population (84.3%) indicated that their line of work is related to the themes on the page, indicating that the information is relevant to their fields or areas of interest in the workplace. In contrast, 15.7% of respondents indicated that their line of work has nothing to do with the topics on the page. This could indicate that they are exploring interests outside of their professional field. A greater percentage of students (93.3%) believe that the page subjects are relevant to their line of work, which may be their area of study. This suggests that the page's content is very relevant to their chosen field of study or profession. Only 6.7% of respondents indicated that the page subjects had nothing to do with their study or line of work.

Regarding the time spent following the page, as shown in the Figure 3b, in both groups where the participants had been following the page more than 1 yr, 47.1% were from the general population and 37.8% from the student group. For those following the page for 6 to 12 mo, we observed slight differences among groups, with ~21.6% and 26.6% in the general population and student groups. For those following the page <3 mo, 20.6% were in the general population and 24.4% in the student group. In both groups, 3 to 6 mo was the lowest following time, with ~10.8% and 11.11% for the general population and student group, respectively.

When asked about their prior knowledge of the Instagram page topic (see Figure 3c), both groups exhibited similar perceptions. Approximately 40.2% of the total population reported having good knowledge, slightly higher than the 30.6% observed among students. Knowl-

edge classified as average was reported by 32.4% of the total population and by 37.8% of the students. Similar proportions in both groups indicated poor knowledge: a total of 21.6% in the general population and 22.2% among students. A small fraction reported excellent knowledge: 5.9% of the general population and 4.4% of the students.

With regard to the questionnaire question related to the knowledge improvement belief among the participants, similar perceptions were obtained in both of the groups. As shown in Figure 3d, the majority of the general population (75.6%) and the majority of the students (74.5%) reported knowledge improvement after following the page, and 25.5% of the students as 24.4% of general population reported no knowledge improvement.

Figure 3e shows the responses to the question regarding the application of knowledge gained from the Instagram page. Similar results were observed across both groups. A total of 64.4% of the general population and 67.6% of students said they had used this information in real-world situations. In contrast, 35.6% of the general population and 32.4% of students said they did not apply the knowledge practically.

As shown in Figure 3f, content preferences vary significantly between the general and student populations. In the general population, the most preferred content type is quizzes and surveys, capturing 33.3% of the interest, which suggests high engagement with interactive content. Following that, stories attract 17.8% of the general population, indicating a strong interest in narrative forms. Videos are also popular, preferred by 15.6%, underscoring a demand for visual media. Of this group, 24.4% choose standard posts, indicating a strong preference for conventional social media formats. In contrast, only 8.9% of respondents think that images are favored, which may indicate that visual information is given less attention than text- or interactive-based media.

Conversely, in the student group, the preferences are slightly different. Standard posts lead with 36.3% favorability, indicating that straightforward, textual, or mixed-media content is highly valued among students. Videos are liked by 14.7% of students, a slight decrease from the general population. Quizzes and surveys engage 21.6%, showing that although interactive content is important, it is less preferred than among the general population. Stories attract 13.7% of students, also slightly less than the general population. Interestingly, the preference for images among students stands at 13.7%, indicating a comparable interest in visual content to narrative forms.

The participants' opinions of the most interesting or helpful content are shown in Figure 4a. With 42.2% of the general population exhibiting interest in these topics, wellbeing, healthcare, and pathologies stand out substantially. New technologies (6.7%), breeds and genetics (8.9%), and milk and its derivatives (11.3%) are

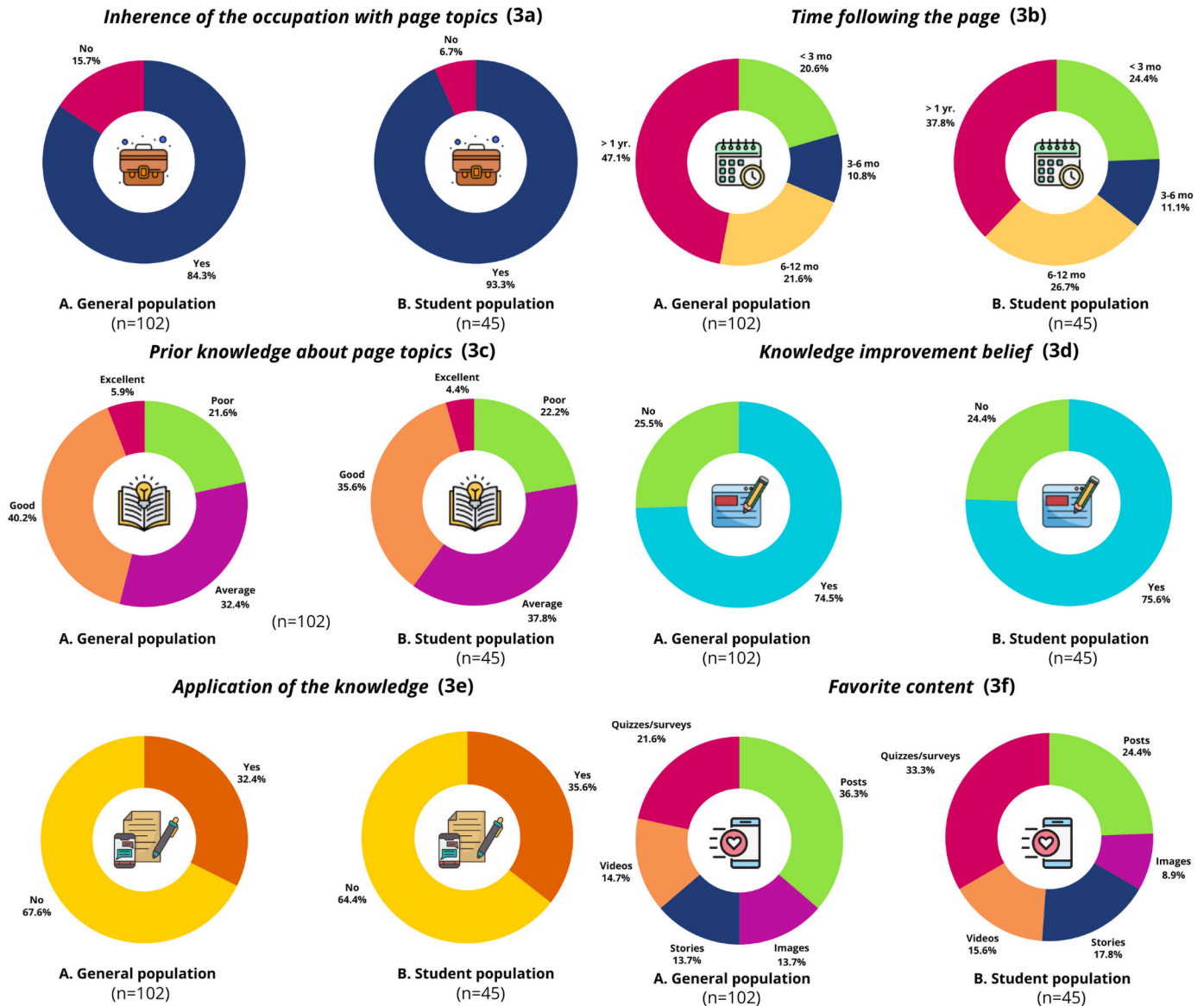


Figure 3. Graphical representation of responses provided in the survey by the general population (n = 102) and the student population (n = 45): relevance of page topics to occupations (3a), time following the page (3b), prior knowledge about page topics (3c), belief in knowledge improvement (3d), application of knowledge (3e), and favorite content type (3f).

other subjects of interest. Scientific research, laboratory activities, teaching methods, and event-related disclosures were among the less popular but equally supported themes, each garnering ~4.4% of attention.

In contrast, the interests of the student population are more varied and extensive. Interest in wellbeing, healthcare, and pathologies declines to 28.6%, despite these topics' considerable importance. With 11.8% of attention going to each, scientific articles and research activities are clearly preferred by this group. Students are noticeably more interested in new technologies, with 12.7% expressing interest. Furthermore, there is a notable level

of involvement in the production of animal feed (8.8%) and in breeds and genetics (7.2%). Students seem less interested in teaching activities and event disclosures than the general population, suggesting a change in priorities. Students' extensive range of interests is probably a reflection of their engagement in the classroom as well as their general curiosity in a variety of topics.

Figure 4b explores the respondents' perceptions of the Instagram page's impact on the understanding and implementation of dairy cow nutrition and management, in relation to the knowledge and professional practices, measured using a 5-point Likert scale. In the general

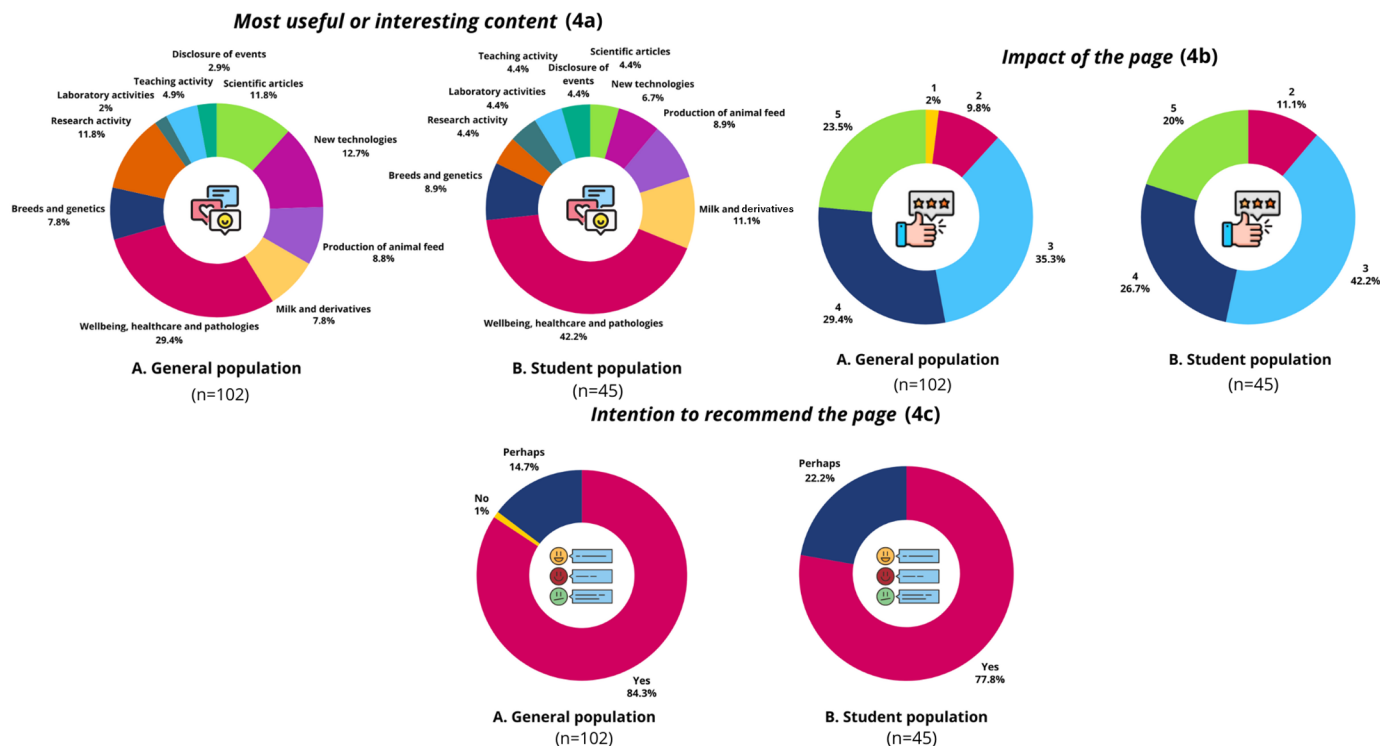


Figure 4. Graphical representation of responses provided in the survey by the general population ($n = 102$) and the student population ($n = 45$): most useful or interesting content (4a), impact of the page (4b, using a Likert scale ranging from 1 = lowest impact to 5 = highest impact), and intention to recommend the page (4c).

population, a plurality (42.2%) neither agrees nor disagrees about the impact of the page, reflecting neutrality. Meanwhile, 26.7% agreed with the page's impact, showing a positive perception, and 20% strongly agreed, indicating a significant portion of respondents recognized the page's influence. In contrast, 11.1% disagree, indicating some skepticism, and the smallest group, 2%, strongly disagree, highlighting a clear rejection among a minority.

The student population exhibits a slightly different response pattern. The largest portion, 35.3%, remains neutral, neither agreeing nor disagreeing with the page's impact. About 29.4% agree with the impact, and a significant 23.5% strongly agree, reflecting a generally positive reception among students. Conversely, 9.8% disagree, and a minimal 2% strongly disagree, indicating some dissent.

Figure 4c illustrates the intent to recommend the Instagram page among the general and student populations. In the general population, a robust 77.8% would recommend the page, indicating strong support and endorsement. In contrast, 22.2% express uncertainty, suggesting hesitation possibly due to mixed experiences or limited interaction with the page.

Conversely, the student population displays an even stronger inclination to endorse the page, with 84.3%

willing to recommend it. This high percentage reflects a greater level of satisfaction and connection with the content. Nonetheless, 14.7% remain uncertain about recommending the page. Finally, only 1% of the student group stated that they would not recommend the page.

DISCUSSION

The present study provides a comprehensive analysis of the Dairy Cow Nutrition University Farm Instagram user demographics, preferences, and behaviors, drawing on a cross-sectional data set that encompasses both general and student populations. By comparing these findings with those of previous studies reported in the literature, this research contributes nuanced insights into effective content strategies for social media platforms. Furthermore, because the Instagram feed is dedicated to the nutrition and management of dairy cows and features best practices in animal welfare, sustainability, and the team's research activities, the content is intended to engage and draw in users with an interest in these specialized subjects.

Our findings revealed a dominant engagement within the age group of 25 to 34 yr in the general population and 18 to 34 yr among students, highlighting a growing

interest in social media across these age groups. Given the fact that the Instagram page belongs to a university, it predominantly attracts individuals within the typical university age group. These findings are consistent with those of Marsh et al. (2021). Similarly, these authors observed comparable trends, where the peak engagement also occurred in these younger age cohorts. According to this comparison, social media sites regularly identify the 18- to 34-yr age range as a crucial demographic in both general and educational contexts. According to this age-related tendency, young adults—especially those enrolled in educational settings—continue to find Instagram to be a useful platform (Muca et al., 2023a). Compared with the results of prior studies, which showed that females used social media more frequently, our study revealed differences in the gender distribution. Surprisingly, in our study the general population showed a female majority at 59.8%, contrasting with the student population, where males significantly dominated at 73.3%. It is worth mentioning that the majority of the students in the University of Bologna are predominantly female. These findings contrast with several previous studies, where females were predominant among student populations (Wong et al., 2019; Schaffer and Debb, 2020; Chan and Allman-Farinelli, 2022; Staniewski and Awruk, 2022). This deviation from the commonly observed female predominance in social media engagement suggests that the content's focus on dairy cow nutrition and management, a field perhaps attracting more male interest, significantly influences gender-specific participation on Instagram.

The study findings indicate a slightly increased international presence among students compared with the general population, suggesting that students may engage more with global networks, possibly due to educational pursuits (Kim and Lawrence, 2021). Contrary to typical urban-centric social media engagement patterns reported in the literature (Dwyer and Molony, 2019; Mare and Matsilele, 2020; Mukherjee et al., 2021), our study shows a higher preference for village residence among students, potentially influenced by the agricultural content on dairy cow nutrition and management. This deviation highlights the relevance of specific content in attracting student engagement from rural areas. These findings expand our understanding of how educational and professional interests influence participation on social media platforms such as Instagram by highlighting the influence of content themes on the residential and geographic contexts of social media users. The population in Italy is distributed rather widely when compared with major cities, which could be another factor contributing to this distribution.

As indicated by the fact that 93.3% of students found the topics on the page relevant to their studies, this high level of relevance suggests that the content is effectively meeting the needs of its audience. Although relevance

alone does not directly equate to active engagement, it strongly implies that the audience is invested in the content because it aligns closely with their educational and professional interests. It is apparent that the dairy cow nutrition and management Instagram page is a valuable teaching resource, especially when it comes to dispelling internet myths and false information that circulate often on the internet (Muca et al., 2023a). Moreover, the longevity of followership on this page, with a notable percentage of both students and the general population following the page for over a year, suggests that the content maintains relevance and value over time. Although retention alone does not equate to active engagement, it does indicate that followers find the page worth staying connected with, potentially due to its provision of credible and accurate information. This sustained connection is particularly important in an era where digital misinformation can spread rapidly, highlighting the value of reliable, scientifically backed content. Interestingly, despite the educational focus, there are evident differences in content preferences between the general population and students, likely reflecting variations in their informational needs and consumption habits. Although the general population preferred interactive content such as quizzes, suggesting a preference for engaging and dynamic learning methods, surprisingly, students advocated for text-based posts as their most preferred content shared via Instagram. This can be explained by the fact that generally students seek for learning materials that can support them in the deeper learning which is essential for academic and professional applications. These observations underline the importance of specialized social media content for professional and educational growth, as well as the need for content producers to tailor their approaches to suit the various demands of their target audiences. The page efficiently promotes continuing education and professional development, advancing knowledgeable practices in the field of dairy management by matching information to the educational needs and professional interests of its followers. This strategic content alignment not only enhances knowledge but also ensures that the information is applicable and practically useful, further enriching the professional and educational landscapes of its audience (Isom et al., 2017; Carpenter et al., 2020; Rahmawati et al., 2023).

The subjects that appeal to the general population and students are different when it comes to the content preferences of various demographic groups on an Instagram page on the nutrition and management of dairy cows. Content about wellbeing, healthcare, and pathologies is highly valued by the general population, with over 42% of respondents indicating a strong interest in these topics. This preference highlights the significance of providing visually appealing posts and images with content that im-

proves comprehension and management of health-related concerns. These formats are probably preferred because they are simple to read and effectively communicate complex information. In contrast, the student group exhibits a broader and more academically inclined range of interests, with noticeable enthusiasm for scientific articles, research activities, and new technologies. This shift not only reflects their academic commitments but also highlights a substantial demand for evidence-based veterinary medicine resources (Steele et al., 2013). A total of 12.7% of students are especially interested to new technologies, indicating a strong interest in advancements in their field of study. Students' increased interest in content related to scientific research (11.8%) and animal feed production (8.8%) suggests that they are looking for thorough, in-depth learning resources that will help them in their current academic endeavors as well as in their future careers. This is a very relevant finding for veterinary education, in particular for veterinary educators and curriculum planners who are seeking to use social media as a teaching tool. The Instagram page can play a more significant role in the field of dairy management through the promotion of informed practices and ongoing learning by tailoring its content strategies to the specific demands of its audience (Muca et al., 2023a).

The different ways that the general and student populations perceive the influence of the Instagram page could be attributed to several factors. There are many reasons for the neutrality that 42.2% of the general community exhibited, including variations in the content's relevance to users' specific needs or a deficiency of direct application of the offered knowledge. This shows that although the information is acknowledged, it could not always be appropriately customized or useful for each follower, which could result in a lack of agreement over its overall significance (Bhatia et al., 2022). Among the 46.7% of the general population who acknowledged a positive impact, this perception likely stems from the page's alignment with their professional interests or personal curiosity about dairy cow nutrition and management. This positive response indicates that the page successfully delivers valuable and engaging content to a significant portion of its followers, particularly those who can directly apply or are intrinsically interested in the topics covered. Conversely, the skepticism represented by 13.1% of the general population who disagreed with the page's impact might be due to the content not meeting their expectations or the presentation format not engaging them effectively. This may indicate a disparity between the way the content is delivered and the requirements or preferences of some followers. This presents a chance for the page administrators to explore further into user interaction strategies or to vary the forms of the content they post (Douglas et al., 2019; Nguyen et al., 2021).

The students' overall more positive opinion of the page's impact (52.9%) may be attributed to their higher alignment with the educational content, possibly as a result of its relevance to their studies or future careers in veterinary and agricultural sciences. To guarantee that the content is responsive to changing educational needs and preferences, a fundamental need remains for continual feedback collecting and content adaptation, even among a more targeted audience, as indicated by the 11.8% disagreement among students.

Many issues still prevent animal nutrition education from being as effective as it could be. Lectures and laboratory exercises are examples of traditional teaching methods that frequently fall short of fully engaging students and may not be able to accommodate the variety of learning styles found in current classrooms (Muca et al., 2023b). Additionally, even though guided tours of animal farms offer insightful first-hand knowledge, they are logistically constrained and difficult to expand to accommodate large groups of students. Although they are essential for disseminating state-of-the-art research and industry updates, specialized publications nonetheless confront many difficulties. The scope of their influence is generally limited to academics and a small number of knowledgeable farmers. Due to the restricted information flow, there may be a knowledge gap that prevents many practitioners from being aware of the most recent developments and suggested protocols in the field of nutrition for dairy cattle (Sellers et al., 2021).

In contrast, a specialized social media page managed by university staff can act as a dynamic medium for informing a large audience about current and correct information. By guaranteeing that important updates and novel results of research are available to a larger and more varied group of stakeholders, this strategy can get around the drawbacks of conventional teaching techniques and specialized journals. Social media platforms have the potential to enable instantaneous interactions among students, educators, and professionals in the industry, thereby establishing an interactive learning environment that transcends traditional classroom settings (Sharp et al., 2024). Furthermore, these platforms provide instantaneous feedback and discourse, augmenting the educational process via ongoing communication and cooperation. This ensures that the latest scientific discoveries and innovations are communicated effectively to those who can benefit from them the most (Akhter et al., 2021).

Some important categories are still underrepresented on the Instagram page, even with a diverse range of followers. Notably, groups such as farmers and industry technicians, who could significantly benefit from the content shared, are not as numerically abundant; they tend to prefer traditional print media over social media

platforms such as Instagram. Generally, these categories are represented by older individuals. Research has indicated that older persons frequently prefer print media because of its perceived dependability and familiarity (Cherian and Jacob, 2013). They lose out on chances to learn important updates and insights that could improve their practices and professional expertise because they are reluctant to interact with digital content (Ventola, 2014). To close this gap, more inclusive content that promotes engagement on Instagram can be made by considering their unique demands and media consumption habits.

Finally, the fact that students are more likely to recommend the website suggests that they regard its content highly. This may be due to the content's educational fit with their academic goals (Muca et al., 2023c). The presence of uncertainty in recommending the page by some followers in both groups could be linked to occasional mismatches between user expectations and the content provided, emphasizing the importance of continuous user engagement and content optimization based on follower feedback to maintain and enhance the page's relevance and impact.

The study is not without limitation, although it offers insightful information regarding social media use in educational contexts beyond the traditional classrooms. The main limitation of the present study is the use of self-reported data, which may have inflated the results due to the tendency of the respondents to answer in a consistent manner. The study sample was also restricted to Instagram page followers, which might not accurately reflect the larger community interested in dairy cow care and nutrition. Additionally, the results may not generalize to other social media platforms or offline educational settings, as the research was limited to Instagram. Future studies should aim to address these constraints by implementing longitudinal designs with objective assessments of knowledge and behavior change, such as pre-test or post-test evaluations, to more accurately measure the educational effect of social media interventions. More rigorous methodologies are needed to overcome the biases inherent in self-reporting and provide a more comprehensive understanding of social media's educational role.

Despite the mentioned limitations, this study has important applications for veterinary science and education. Based on the study results, Instagram demonstrated its potential to be a very useful teaching tool, especially in subjects that require interactive and visual learning. The study highlights the importance of interactive posts and quizzes, which have been demonstrated to improve user engagement and learning. Educators in fields beyond dairy cow nutrition and management, and professionals in diverse fields can use this study as a basis to customize their digital methods, to offer their students a wide range

of digital learning resources, aiming to help them improve the studied outcomes. Finally, the educational content should be tailored to their audience to be responsive and engage the users consistently. Future research directions should aim to adopt more rigorous methodologies that provide objective assessments of educational interventions. Implementing longitudinal study designs would be essential to capture knowledge retention and behavior change over time. Specifically, the use of pre-test and post-test evaluations could more accurately measure the educational effect of social media interventions such as Instagram. By incorporating objective tools for assessing both knowledge gains and practical application, such as standardized evaluations or behavioral observation in real-life scenarios, these studies could provide a more comprehensive understanding of how digital platforms influence professional practices. Additionally, longitudinal studies would help identify the sustainability of behavior changes induced by social media content, ensuring that improvements are not only immediate but also long-lasting. These future studies should also consider incorporating mixed methods to assess not only the quantitative effect but also the qualitative nuances of learning via social media platforms. Social media offers immense potential in educational contexts, but it is essential to acknowledge the risks of misinformation, which can spread faster than scientifically sound content (Lamanna et al., 2024). Thus, ensuring that digital interventions consistently promote evidence-based information is crucial for supporting professional practices based on accurate, reliable knowledge.

CONCLUSIONS

This study adds to our knowledge of social media's role in education, particularly in the management and nutrition of dairy cows, which is a specialized field within the veterinary discipline. Findings confirm Instagram as a platform for both social interaction and significant educational resource, enhancing knowledge and practical application in specialized fields. High engagement with educational content and improved knowledge among followers highlights social media's potential as an educational tool. The study highlights tailored content techniques for a range of learning demands by revealing varying preferences and effects across demographic groups. Educators and professionals need to adjust their methods to fully use the evolving digital platforms. Future research should explore these strategies across various platforms and educational contexts to build on this study's insights. Through innovative approaches to social media use in education, stakeholders can improve student outcomes and better prepare students for success in the workplace in the digital age.

NOTES

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Nonstandard abbreviations used: IGTV = Instagram TV.

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