Research

Impacts of wolves on cattle farming in Switzerland

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Introduction

Since the natural return of wolves (*Canis lupus*) to Switzerland in 1995, their population has rapidly increased, reaching approximately 310 individuals and 35 packs[1] by 2023 (Figs. 1 and 2). Along with this growth, especially during the last decade, there has been a rise in attacks on livestock. While sheep account for the majority of animals killed[2], attacks on large stock have become more frequent recently, with the number of depredated cattle increasing from zero in 2019 to 38 in 2022 (Fig. 3).

In contrast to sheep farming, which is often practiced as a sideline, cattle farming holds a significant position in Swiss agriculture (Fig. 4). Dairy farming, in particular, is not only economically significant but also represents an integral part of the identity of Swiss farmers [1]. Therefore, ensuring coexistence between cattle farming and wolves with low levels of associated conflict is crucial for the acceptance of wolves and the preservation of livestock farming in Switzerland.

Research conducted elsewhere indicates that the presence of wolves can have both direct and indirect effects on cattle farming [2]. While North American literature emphasises the impact of wolves on cattle behaviour and stress levels [2–4], European studies have tended to concentrate on quantifying the economic consequences for livestock farmers and assessing the (in)effectiveness of compensation systems, which do not necessarily reduce damage or promote tolerance [5–9]. Illegal killing of wolves in response to predation on livestock occurs on both continents, particularly in Italy and Greece [8,10,11].

In Switzerland and neighbouring Alpine countries, research has highlighted the financial burden arising from impacts of wolves on cattle, both direct (injured and killed animals) and indirect (abortions, decreased production, stress, reduced reproduction rates, etc.), as well as the maintenance of herd protection measures or adjustments in grazing practices, with costs often exceeding compensation payments [12–15]. While in Scandinavia it is suggested that large carnivores can affect the psychological wellbeing of farmers [16,17], surprisingly little research has been conducted on this topic in the Alps, although the presence of wolves, especially, is reported to result in significant emotional distress for some farmers [12,18].

[1] https://www.kora.ch/en/species/wolf/abundance
[2] https://www.kora.ch/en/species/wolf/depredation

Fig. 1. Wolves 'caught' by trail cameras in the canton of Vaud (Photos: KORA).

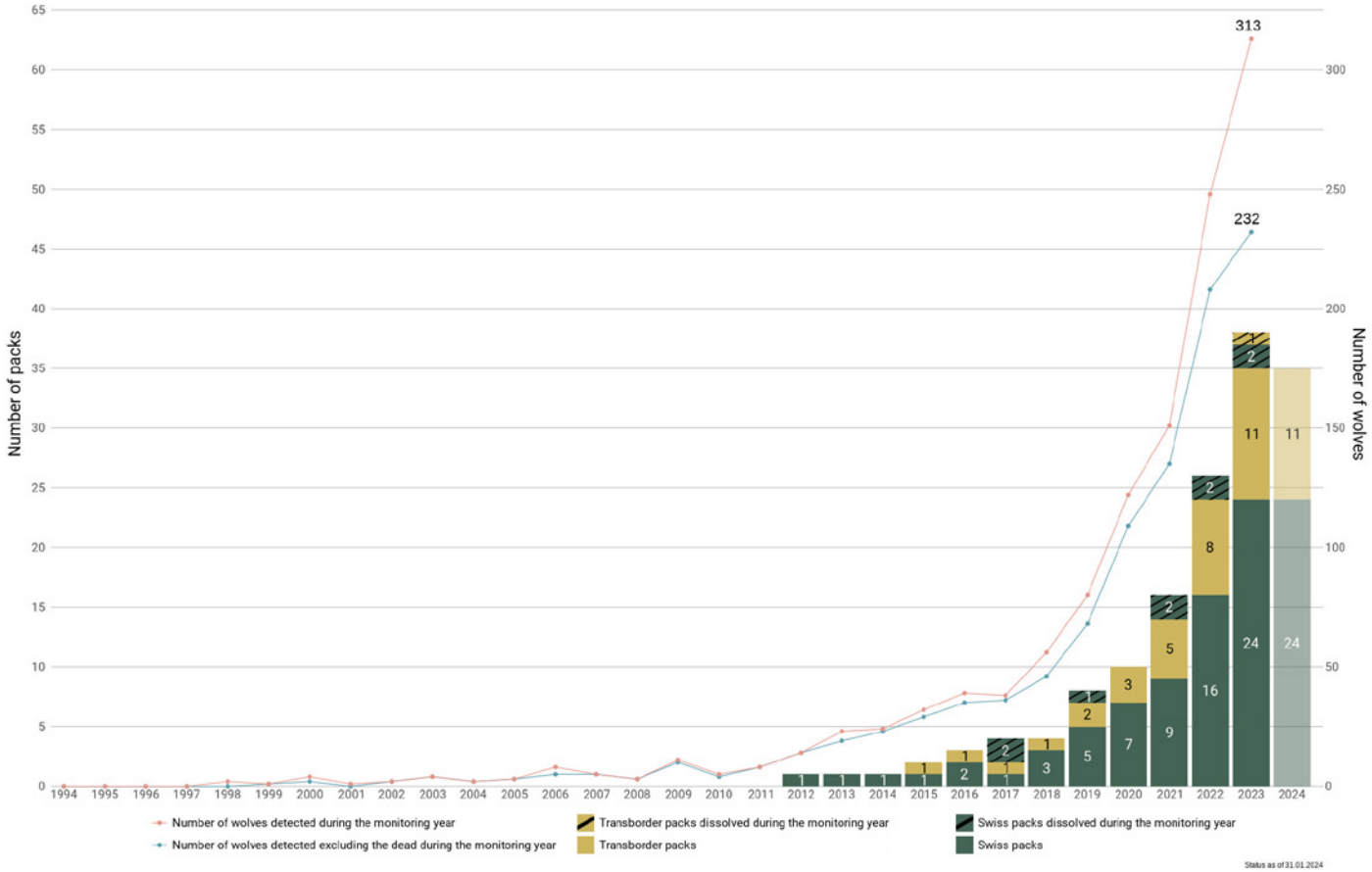

Fig. 2. Development of the Swiss wolf population since 1994 showing numbers of detected individuals and packs; those for 2024 apply to the end of January (Source: cantons).

Research on the human dimensions of wildlife[3] has revealed predominantly negative attitudes towards wolves within the North American and European agricultural sectors [20,21]. Negative attitudes toward wolves and wolf conservation are observed among farmers in the Italian and Slovenian Alps [22]. Though there are no studies on this specific aspect in Switzerland, a discrepancy was found between ecologically suitable wolf habitats and social acceptance, especially in Alpine regions [23]. Research from 2001 indicates broad support for wolves among Swiss people, but acceptance decreases in areas with wolf presence due to concerns about potential damage and threats to the economic sustainability of agricultural businesses [24,25].

[3] Defined as the way "humans value wildlife, how humans want wildlife to be managed, and how humans affect, or are affected by wildlife and wildlife management decisions" [19].

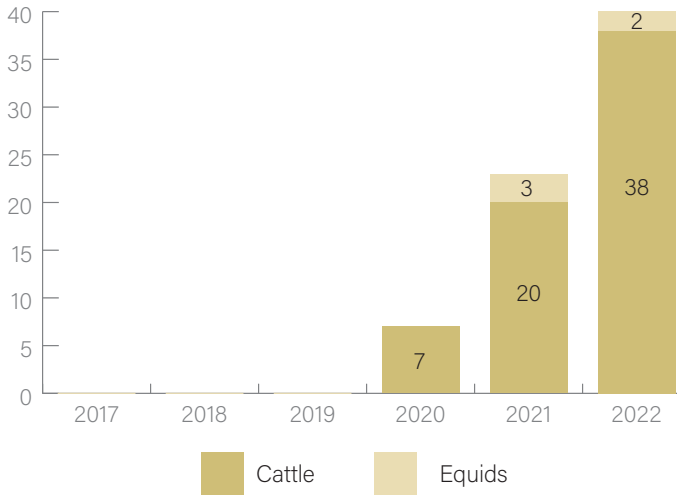

Fig. 3. Wolf depredation on large stock (cattle and equids) in Switzerland in 2017–2022 (Source: cantons, FOEN).

To increase understanding of the needs and attitudes of people affected by wolf presence in Switzerland, we investigated two main aspects within the framework of the Wolves and Cattle project[4] (Fig. 6–8). Our primary goal was to identify the potential effects of wolf presence on Swiss cattle farming, with a focus on economic, social and psychological dimensions. To achieve this, we asked experts from the cattle industry to assess the current situation and possible future developments. Secondly, we examined how these experts perceived the attitudes and expectations of cattle farmers towards wolf management.

Methods

To explore the effects of wolf presence on Swiss cattle farming and to gain a better understanding of farmers' perspectives of wolves, a qualitative data collection method was chosen. Problem-centred, semi-structured interviews created an open and flexible environment for delving deeply into the subject matter and addressing sensitive issues [26]. A protocol was developed by formulating hypotheses drawn from key findings of a preliminary literature review [27]. The resulting questions addressed aspects related to the two research questions on the effects of wolf presence and expectations regarding wolf management.

Interviewees were selected on the basis of a predetermined sample structure [28], with the prerequisite that they possess sector-specific knowledge and substantial experience [27]. The selection aimed at representing diverse perspectives as well as providing insights from potentially affected cattle farmers and thereby considering emotional aspects of conflict. To ensure a diverse range of knowledge, a total of nine experts were selected in accordance with the following profiles:

1) Two researchers at an agricultural institute with expertise and research activity on wolf–cattle issues;
2) Three consultants in alpine farming and agriculture (one of whom was a cattle farmer), covering aspects related to wolf–cattle issues;
3) Four representatives of the cattle industry at national, cantonal or regional level, with personal involvement as a potentially affected cattle farmer (all cattle farmers).

The purpose of the study was explained to all respondents and their informed consent was obtained. Interviews were conducted in April–May 2023. Except for one held online, they were all undertaken face-to-face, each limited to between one and 1.5 hours to maintain concentration levels. Interviews were recorded and fully transcribed following standard procedures [29]. Due to the sensitive nature of the topics discussed, all information potentially allowing identification of interviewees was anonymised.

To reduce and structure the material obtained and allow research questions to be answered, responses were analysed using qualitative content analysis [30] with the aid of MAXQDA text analysis software. The analysis involved establishing various first-level categories based on an impact model [31]. These categories, corresponding to six different impact areas (economic, social, psychological and physical, political, cultural, ecological), were predefined deductively. Additionally, a seventh main category aligned with the attitudes and expectations of cattle farmers was derived from the second research question. Subsequently, a second level of categories was developed inductively during text interpretation, iteratively shaped by the content of the statements (Fig. 5). This process illustrates the openness of the analysis method [30].

[4] https://www.kora.ch/en/projects/wolf/wolves-and-cattle

Fig. 4. Herd of cows at Brienzer Rothorn, Bernese Oberland (Photo: Evelyn Böttinger).

Results

Potential effects of wolf presence on cattle farming

During our interviews with experts, indirect effects were emphasised. Most interviewees referred to changes in the behaviour of cattle herds such as frightened, distressed, aggressive or escaped animals, often with unclear causes. Health problems in cattle resulting from attacks or indirect consequences like stress-induced fertility problems and abortions raised further concerns (Fig. 5).

Regarding economic aspects, almost all interviewees mentioned the additional personnel and financial costs needed to implement protection measures (e.g. calving pens) along with appropriate pasture management and operational adjustments. Besides the additional effort required to prevent wolf attacks, interviewees also noted the significant extra workload and costs following a wolf attack. These may include repairing fences, recapturing the herd, transporting and treating injured animals as well as dealing with diseases in suckler cows (e.g. mastitis) or rearing calves following losses due to predation.

Especially problematic, according to the interviewees, is the unpredictable nature of wolf attacks, leading to difficulties in planning farmwork, and the absence of compensation for some aspects, particularly the additional workload and if the involvement of wolves cannot be proven. Further indirect effects of wolf presence highlighted in the interviews were the loss of revenue due to insufficient weight gain or reduced milk production as a result of wolf-induced stress as well as poor health condition and fertility problems after operational changes in the farming system.

Besides a lack of compensation for indirect effects, half the respondents also expressed concerns about financial remuneration following a wolf attack. They criticised the fact that compensation is only paid for the actual slaughter value, neglecting the breeding value of the animal. Additional losses resulting from wolf attacks, which are challenging to verify and therefore to obtain compensation for, include cattle fallen from mountain cliffs, abortions or emergency slaughter of distressed animals that can no longer be kept. Interviewees empha-

sised that, despite limited prior experience, no cattle farms or alpine pastures have been abandoned solely due to wolves. Two respondents cautioned that increased wolf predation pressure could lead to farm closures, but not endanger the entire cattle industry. Still, concerns remain about the future feasibility of current farming practices, such as extensive grazing in traditional alpine farming.

Considering social effects of wolf presence, half the interviewees mentioned pressure within the cattle industry. Two perceived it as very high, with one expressing concern about personal threats from extreme wolf opponents, highlighting the emotional intensity of conflicts. Others found the social pressure less problematic. Potential clashes between cattle and hikers, especially in touristy mountain areas, were also discussed in several interviews. Concerns included the possibility of cattle agitated by wolf attacks causing accidents with tourists. Additionally, in two interviews it was pointed out that the wolf issue reflects and deepens an urban–rural divide, further deteriorating agriculture's societal image. However, in regions with high wolf impacts, there is a perceived shift among non-affected people towards more understanding of cattle farmers. Concerns about vigilante justice emerged in two interviews, with worries that overwhelmed individuals might resort to shooting wolves, highlighting the potential for escalating tensions and conflicts.

The interviews revealed that the presence of wolves is perceived as a significant cause of stress for cattle farmers. Attacks on livestock and unforeseen losses can impose a considerable psychological burden due to the strong emotional attachment of farmers to their animals. In addition to the emotional impact, which cannot be compensated for, three experts expressed feelings of powerlessness and helplessness due to their animals' vulnerability and the inability to protect them. Unacknowledged concerns along with limited protection options, the perception of efforts being one-sided and insufficient support contribute to frustration and disappointment among cattle farmers.

Another aspect frequently criticised in the interviews is the politicisation and instrumentalisation of wolves, partly fuelled through the dissemination of misinforma-

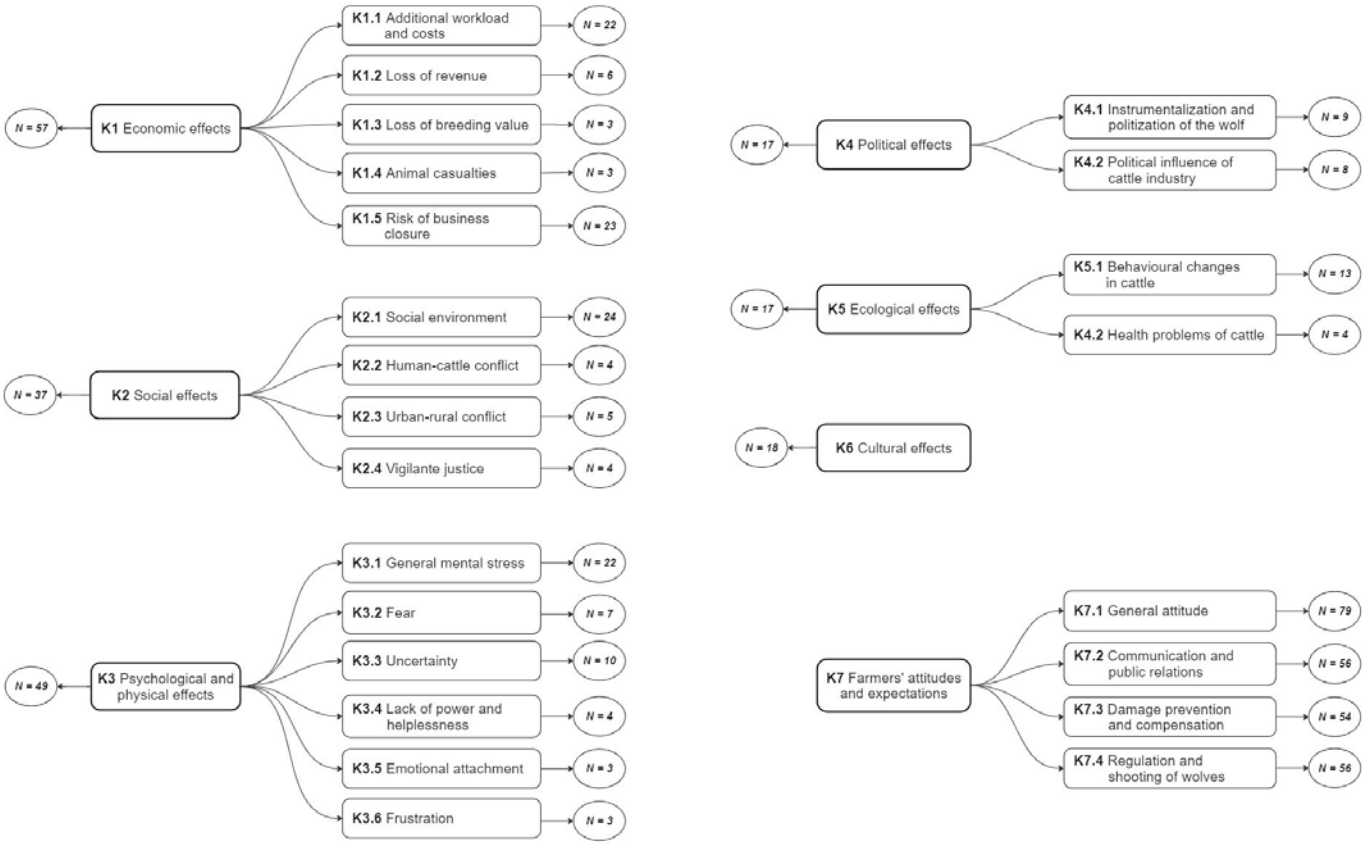

Fig. 5. Overview of seven main categories of potential effects of wolf presence on cattle farming and expectations towards wolf management along with their respective subcategories. The number of statements (N) assigned to each category reflects the number of times the respective focus of those aspects was mentioned in interviews. Respondents could make multiple statements within the same category, indicating its relative importance.

tion by agricultural organisations. Besides this, half the interviewees highlighted the political influence of the cattle industry, attributed to their strong network and well-organised associations.

Regarding possible cultural effects, some respondents expected rather minimal changes in traditional alpine farming due to wolves, while others were concerned about the potential impact on summering decisions, highlighting the significant emotional and economic burden. Overall, according to the experts, wolf presence poses a significant challenge, particularly in alpine farming, exacerbating existing difficulties. While it is not currently seen as a major financial problem for Swiss cattle farming overall, nevertheless some farms, especially those already facing economic constraints, may experience severe consequences.

Farmers' attitudes and expectations towards wolf management

The general attitude of the cattle industry towards wolves as described by the interviewees was clearly negative. Two respondents felt that wolf attacks on cattle are not tolerated or accepted by livestock farmers. Regarding attitudes towards wolf management, almost all respondents mentioned a lack of trust among livestock farmers in the institutions responsible. One interviewee also emphasised the allegedly poor reputation of KORA[5] and its perception within the cattle industry as advocating for wolves. In addition, four interviewees criticised one-sided demands and constant expectations regarding the implementation of protection measures along with inadequate regulation of the wolf population. Key aspects contributing to negative perceptions, as highlighted by interviewees, also included insufficient integration of the cattle industry into management processes and a perception among affected farmers that their concerns are not taken seriously. Apart from a proposal to involve livestock farmers in finding solutions, two respondents suggested developing strategies at the level of individual farms that consider Alp-dependent perspectives and specific characteristics of the cultural landscape.

Most respondents considered communication by wolf management authorities to be relatively well-organised, although a few described it as insufficient and slow, advocating for quicker, more transparent and targeted information. They generally requested easily accessible and understandable information, while also emphasising personal responsibility for staying informed. Given the dynamic nature of wolf presence, some interviewees also criticised the dissemination of monitoring data as being too slow, calling for real-time information as well as regular and prompt updates. Another mentioned the positive aspects of wolf monitoring as informative and objective and disapproved of the lack of use by farmers. The provision of information on wolf presence and livestock attacks via cantonal SMS or WhatsApp services was largely praised as an effective early warning system. However, interviewees noted that constant exposure can have negative impacts, suggesting message filtering and voluntary subscription without obligation in order to mitigate emotional strain. Finally, one interviewee recommended using agricultural channels for communication to foster trust and promote a uniform knowledge base among farmers.

Currently, the only damage prevention measure recommended for cattle and paid for by the Federal Office for the Environment (FOEN) are calving pens designed to protect new-born calves for up to two weeks after birth. Most interviewees expressed a fundamental rejection of any additional mandatory herd protection measures for cattle. However, it was highlighted that voluntary measures are generally favoured. One interviewee noted an increasing willingness in his region to adopt voluntary herd protection and explore individual solutions due to the rising wolf pressure and the growing number of affected farmers. Nevertheless, this poses challenges due to the limited budget and resources.

Some respondents voiced frustration and confusion about the limited feasibility of prevention measures for cattle that cannot be reasonably protected, attributing this in part to the challenging topography of many alpine regions. As an individual emergency strategy, descending early from alpine pastures is often viewed as a last resort for protection. However, one interviewee noted that transporting distressed animals is difficult to achieve. Furthermore, three respondents were in favour of establishing a herd protection task force, consisting of experienced persons, to assist cattle farmers and alpine person-

[5] A non-profit foundation among others tasked by the Swiss Federation and cantons to monitor large carnivores (https://www.kora.ch/en/kora).

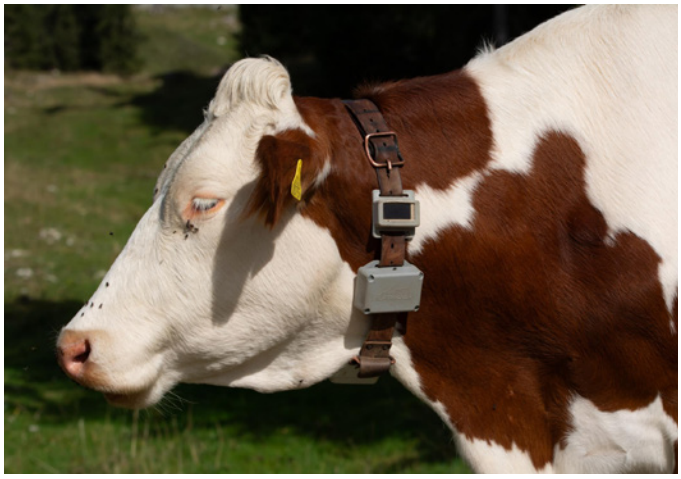

Fig. 6. A Montbéliard heifer in the Jura Vaudois equipped with a GPS collar as part of the Wolves and Cattle project in order to determine possible changes in cattle behaviour and habitat use associated with the presence of wolves (Photo: KORA).

Fig. 7. Herd of heifers in the Croset du Buron, Jura Vaudois, that is being analysed within the Wolves and Cattle project (Photo: KORA).

Fig. 8. Montbéliard and Red Holstein heifers in La Sèche de Gimel, Jura Vaudois, included in the Wolves and Cattle project in summer 2024 (Photo: KORA).

nel after incidents, despite acknowledging the considerable effort required.

All respondents called for proactive regulation of the wolf population and shooting of problematic wolves due to concerns about their growing number and increasing impacts. Some interviewees also advocated for the removal of entire problematic wolf packs, emphasising the necessity for immediate culling following attacks on large stock. At the time of the study, the hunting law[6] had been revised to provide a legal basis to shoot problematic wolves more readily and allow proactive wolf population control to prevent damage to livestock. This amendment was positively viewed by most respondents, yet the actual implementation of the law was still unclear at the time of the interviews as it did not come into force until December 2023. [*Editor's note: see pages 29–31 in this issue.*] One interviewee opposed the legal framework permitting widespread shooting of wolves and instead advocated for targeted removal of problematic wolves.

Respondents considered the granting of shooting permits and their implementation to be too slow, necessitating an increase in personnel resources due to the challenges of shooting wolves. Additionally, two interviewees raised concerns that normalising attacks on cattle could

[6] SR 922.0 Hunting Law; SR 922.01 Hunting Ordinance.

jeopardise cattle farming, highlighting the need for adequate regulation to protect alpine farming and ensure a sustainable future. Therefore, according to them, wolf regulation is considered essential for fostering coexistence between wolves and cattle farmers. According to two interviewees, a crucial aspect should ultimately be a change in public perception and appropriate reporting that presents lethal control as an integral part of the solution. However, one interviewee advocated for an ongoing coexistence with wolf packs and emphasised the need to convey realistic expectations regarding regulation and to communicate its complexity due to the high effort required. Other interviewees similarly acknowledged the need to adapt to occasional livestock attacks. One interviewee expected that the implementation of the new hunting law should lead cattle farmers to anticipate a greater willingness to address herd protection and engage in dialogue.

Discussion

The results of this study, based on qualitative interviews with nine experts from the Swiss cattle industry, indicate that the consequences of wolf presence on cattle farming do not currently pose a problem in purely financial terms. However, they highlight the significance of perceived indirect effects of wolf presence on cattle farming.

Economic effects

Interviewees considered the indirect economic effects, such as unpredictable additional costs and increased workload, to be problematic. It has been previously reported that wolf-related stress may potentially result in reduced reproduction rates or decreased weight gain in cattle [13,32,33]. Inadequate compensation for such losses, particularly in the case of valuable breeding animals, was criticised by the interviewees, which aligns with the findings of a study on the effects of wolves in the Eastern Alps [13]. In the northwestern United States, 'compensation ratios' are applied, such as paying seven times the market value for each killed cow or calf to cover additional costs from unverified losses [34]. Another suggestion for Alpine sheep farming involves compensating actual additional costs based on a farm-specific plan, though this would require significant administrative effort [15]. Although these recommendations cannot be directly applied to Swiss cattle farms due to different farming systems and economic conditions, they highlight the shortcomings of the current Swiss compensation system.

Regarding the risk of farm closures, the interviewees did not believe that wolves jeopardise the existence of cattle farming in Switzerland *per se*. However, a reduction in the summering of cattle as well as adjustments of current farming practices such as a decrease in grazing areas could be potential consequences of wolf presence [12,13]. A decline in summering can already be observed in small stock farming, although factors other than wolf presence play an important role in this [12,18,35].

Psychological and social effects

A significant impact of wolf presence identified in this study is the psychological burden it imposes on cattle farmers, which is often overlooked. Uncertainty about potential attacks and the health and wellbeing of their animals can cause considerable stress and worry for livestock owners, as has been previously reported from Switzerland [18] and elsewhere [17]. Various factors may influence the intensity of stress in connection with wolf presence, such as the feeling of a lack of control and emotional attachment to livestock [17], which is considered high in Swiss livestock farming [1].

Another mental stress factor described by respondents in our study is uncertainty about the future of cattle farming and associated concerns about the further development of wolf impacts. Such worries are shared by a large proportion of farmers in the canton of Grisons [12]. With growing wolf numbers, it is likely that psychological distress could spread among previously unaffected farmers, as the mere presence of wolves can cause higher stress levels [16,17]. We therefore recommend investigating this topic further to understand the full extent of psychological impacts and develop appropriate support mechanisms for affected farmers.

Although social pressure within the industry was not considered very important by the majority of respondents, some stated that they had experienced pressure among farmers due to the emotional nature of the conflict [36]. Social influence also seems to play a role in the adoption of protection measures, as in the past there was a com-

mon view among Swiss livestock farmers that implementing herd protection for small stock implied supporting wolves [37]. Such peer pressure could be a potential barrier to the uptake of appropriate measures and thus a hindrance to the search for solutions, possibly even contributing to the intensification of conflicts [38]. Social tensions can also emerge due to illegal killing of wolves, which represents a serious problem for their conservation [8]. Therefore, it is crucial to address the concerns of livestock owners and implement an effective wolf management system that is widely accepted by cattle farmers.

Attitudes and expectations

The experts we interviewed within this study echoed previous findings that cattle farmers in Switzerland have distinctly negative attitudes towards wolves. This is not surprising given that attitude is the result of a dynamic interplay of individual, societal and cultural factors [39] and is influenced by values that are shaped early in life [40]. Furthermore, attitude correlates with emotional attachment to livestock [17] and experience with wolves [41]. Economic effects and compensation payments are unlikely to have much influence on farmers' attitudes [42].

Our interviews also revealed a low level of tolerance towards wolf attacks on cattle and a lack of trust in the institutions responsible for wolf management and monitoring. Due to the poor acceptance of information of third parties, such as management institutions, and a mistrust towards scientific approaches [38], influenced by factors such as communication style, perceptions of scientists as wolf advocates and the complexity of scientific methods [43], one interviewee recommended disseminating communication through agricultural platforms. Livestock owners could be engaged as ambassadors within a peer-to-peer approach to, for example, promote the adoption of protection measures [38].

In general, the interviewees called for faster, more transparent and targeted communication from management institutions and timely information about the presence of wolves. However, as constant reminders through warning systems may add stress [17], some interviewees advocate voluntary subscriptions and filtering of messages. Furthermore, most interviewees stressed the importance of substantive dialogue on equal terms to promote mutual understanding.

Another important result of this study is the fundamental rejection of additional compulsory protection measures for cattle: an uncompromising position that was clearly communicated by the industry at an early stage. Instead of mandatory measures, respondents favour the testing of voluntary strategies and individual, farm-specific solutions. Previous authors recommended considering local contexts and emphasised that efficient implementation of prevention measures depends heavily on close cooperation between experts and farmers [14]. A survey in Grisons indicated that farmers could be more willing to adopt protection measures when they are directly affected [12], given that economic viability is guaranteed [44]. Therefore, providing sufficient financial and technical support to affected farmers is recommended to enhance their motivation and capacity for implementing (voluntary) protection measures, enabling experimentation with farm-specific adaptations, thus enhancing the effectiveness of herd protection.

Interviewees unanimously called for proactive regulation of the wolf population and removal of problematic wolves. This demand from the agricultural industry was met with the revised hunting law, which enabled proactive regulation of the wolf population for the first time in December 2023[7] and led to the shooting of 38 wolves by the end of January 2024[8]. Nonetheless, some respondents warned that relying solely on lethal control (neglecting other management approaches) may not be effective, a sentiment supported by multiple studies elsewhere [45–47], although they may have limited applicability to Switzerland due to the different socio-ecological and agricultural contexts.

Finally, interviewees emphasised the importance of taking farmers' concerns more seriously and engaging with them. To increase their empowerment, it is essential to involve farmers in the entire solution process including data collection, decision-making and implementation of management actions [41]. Therefore, early involvement of affected cattle farmers through participatory approaches such as strategy games are recommended to mitigate conflicts and to co-develop effective solutions [48,49].

[7] https://www.bafu.admin.ch/bafu/de/home/dokumentation/medienmitteilungen/anzeige-nsb-unter-medienmitteilungen.msg-id-98995.html
[8] https://www.bafu.admin.ch/bafu/de/home/dokumentation/medienmitteilungen/anzeige-nsb-unter-medienmitteilungen.msg-id-100533.html

Conclusions

Despite the small number of interviewees and limited geographic scope, this study provides valuable insights into the impacts of wolves on Swiss cattle farming. The findings underscore the significant challenges posed by wolves, particularly their indirect and hidden effects from economic, social and psychological perspectives. While wolves do not currently present a significant economic problem on a national level, it is expected that their ongoing recovery will exacerbate existing social conflicts and psychological burdens. Greater importance should therefore be attributed to social and psychological aspects.

As indirect costs or losses are difficult to measure but likely to be significant, they warrant further investigation. Special attention should be paid to the economic effects on farms in summering and mountain areas, as these are particularly vulnerable due to the already burdensome challenges of climate and structural changes and the lack of alternatives.

Given the categorical rejection of mandatory protection measures by the cattle industry, it is recommended to involve farmers in management processes at an early stage. In this regard, it is essential to emphasise the significance of cooperation and compromise in mitigating conflicts and addressing the complex ongoing challenge of wolf recovery in Switzerland.

Acknowledgments

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