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Bear with me: Understanding motivations for bear farming in Vietnam

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Bears were once farmed legally across Vietnam to supply bile, a digestive fluid, as an ingredient for traditional medicine products. Extracting and selling bear bile has been prohibited in Vietnam since 2005, but there is evidence that an illegal industry remains active. The aim of this study is to gain insight into the motivations and experiences of Vietnamese bear farmers. Thirty-seven semi-structured interviews were conducted with 28 active and 9 former bear farmers across 14 provinces in Vietnam. Our findings confirm previous reports in the literature that there is still an active, illegal bear bile market in Vietnam, but that bear farming is becoming less profitable due to a reduction in demand for farmed products and the decreasing price of bile. Additional results indicate that many Vietnamese bear farmers may have a poor understanding of regulations governing the trade of bear parts and that most farmers do not intend to stop farming bears. Based on these findings, we suggest the most effective method of persuading bear farmers to stop trading bile would be *via* former bear farmers and to reduce the social acceptability of bile consumption throughout the country. We hope the results of this study can help refine strategies and inform future efforts to end the bear bile industry in Vietnam.

KEYWORDS

bear farmers, bear bile, traditional medicine, Vietnam, *Ursus thibetanus*, *Helarctos malayanus*

Introduction

The use of bear bile in traditional medicine is well documented in the literature (Feng et al., 2009; Foley et al., 2011) and is commonplace in spatially distinct areas across Vietnam (Nguyen, 2007; Drury, 2009; Drury, 2011; Ngoc and Wyatt, 2013; Wilcox et al., 2016; Crudge et al., 2018; Davis et al., 2019b; Davis et al., 2021). Bear gall bladders and bile are used as medicine for the treatment of many ailments, including fighting fever, combatting inflammation conditions, and reducing cholesterol (Feng et al., 2009). Bile, a fluid stored in the gall bladder, is considered a particularly valuable ingredient because it contains the active pharmaceutical compound Ursodeoxycholic acid (UDCA), which is

recognised as effective treatment for liver disease (Rubin et al., 1994; Li, 2004; Amaral et al., 2009; Wilcox et al., 2016).

In Vietnam, bile is extracted from living bears by sedating the bear and using ultrasonic equipment and long needle syringes to locate the gall bladder and drain the bile. Mass bear bile extraction facilities, known as bear bile 'farms' were introduced to Vietnam in the 1990s to meet a growing demand for traditional medicine products containing bear bile, thought to be fueled by a number of social factors, including rapid growth in urban prosperity (Venkataraman, 2007; Drury, 2009; Crudge et al., 2018). In the early 2000s, at the height of the Vietnamese bear farming industry, there were around 4,500 individual bears on farms throughout the country. Although they were not as large as the commercial bear farms established across China, they still produced enough bile to supply a strong domestic demand (Burgess et al., 2014; Wilcox et al., 2016). According to official government records, the number of bears on farms in Vietnam reduced to 1,250 individuals in 2016 and again to 327 in August 2021 (Education for Nature Vietnam, 2021).

Bear farms are associated with a plethora of animal welfare and conservation concerns. Malnourishment, unhygienic conditions, stress-induced behaviours, infected wounds and inhumane treatment have been documented at farming facilities across Asia (Maas, 2000; Li, 2004; Loeffler et al., 2009; Kikuchi, 2012; Bando et al., 2019). Farms have also been criticised for negatively impacting wild bear populations; although the introduction of farms was presupposed to reduce pressure on wild populations by flooding the market with cheaper products and decreasing the profitability of poaching, in reality the use of wild bears has not subsided with the growth of farming (Crudge et al., 2018). It has even been suggested that bear farms could increase the incentive to poach wild bears to supplement captive populations and meet demand that farms are helping sustain (Livingstone, 2016; Nijman et al., 2017). The relationship between farming and poaching is complex, but data show that populations remain low following declines during the 1990s – 2000s and that use and trade in bear parts and derivatives is still widespread throughout Vietnam (Davis et al., 2019b). Both species of bear native to Vietnam (Sun Bear *Helarctos malayanus* and Asiatic Black Bear *Ursus thibetanus*) are considered vulnerable and decreasing by the International Union for Conservation of Nature (IUCN) Red List of Endangered Species and have both been listed on Appendix I of the Convention on International Trade of Endangered Species (CITES), prohibiting international commercial trade except for in exceptional circumstances.

The welfare and conservation concerns associated with bear bile farms resulted in increased pressure from international NGOs to provide better protection for bear populations (Education for Nature Vietnam, 2010; Wilcox et al., 2016; World Animal Protection Cruel Cures, 2020; Animals Asia Foundation, 2021). Although hunting bears has been illegal in Vietnam since 1992, lack of enforcement capacity has contributed to enabling its continuation (Nguyen, 2007). To strengthen protection the government introduced Decree No 32/2006/ND-CP in 2006, making it illegal to hunt, transport, keep, advertise, sell, purchase or possess either bear species or their parts and derivatives (Wilcox et al., 2016). One year previous, in 2005, all bears on farms were microchipped and registered to the government and it was made illegal to acquire any new bears or to replace existing ones (Nguyen, 2007). This means that any bears found without microchip registration since 2005 have been acquired illegally and are subject to confiscation and legal sanctions (Wilcox et al., 2016). Farmers are permitted to keep microchipped bears on their premises, but it is illegal to extract bile from them. This makes it challenging to detect illegal extraction of bear bile that may enable the illegal market for bile to thrive.

The current laws governing the keeping of bears are Decree 160 of 2013 and Decree 06 of 2019. Laws regulating bears are implemented and enforced by the Forest Protection Department (FPD) of the Vietnamese government. If farmers want to stop keeping bears on their farms the FPD can arrange for them to be transferred to appropriate captive facilities (Nguyen, 2007). These rescue facilities were established by NGOs with support from the Vietnamese government. Since microchipping and associated regulations were introduced in 2005, bear farms have declined throughout the country (Education for Nature Vietnam, 2018). Despite this decrease in farms and an increase in legal protection, there is evidence that the bear bile industry in Vietnam still continues (Crudge et al., 2018; Davis et al., 2019b). Studies have shown bear bile is still commonly consumed and even still prescribed by some medical practitioners (Davis et al., 2019b). In 2016, wildlife trade monitoring network TRAFFIC identified Vietnam as a significant consumer and producer of bear bile after finding bile products for sale in 40% of traditional medicine outlets surveyed (Wilcox et al., 2016). However, it is worth noting that this was down 25% from the 65% of outlets observed selling bile products in 2010 -2011 (Wilcox et al., 2016). A recent study showed comparatively low demand across Vietnam (Davis et al., 2021) and another study reported a 61% decrease in bile product consumption among Vietnamese participants between 2009 and 2014 (Education for Nature Vietnam, 2010). This suggests that while the bear bile market may still be active, consumption (and consequently, demand) looks to be falling.

The aim of this study is to gain insight into the motivations and experiences of Vietnamese bear farmers. Farmers are among those at the heart of the illegal bear bile industry, providing the market supply of farmed bile. Davis et al. (Davis et al., 2019b) highlight the importance of addressing both the supply-and demand-side of illegal trade in wildlife products for successful interventions (Wallen and Daut, 2018; Willemsen and Watson, 2018; Veríssimo and Wan, 2019). Crudge et al. (Crudge et al., 2018) interviewed farmers to investigate the reasons for the decline in the number of bears held in bile farms in Vietnam and

to analyse the conservation potential of bear bile farming in Vietnam. Building on these insights, we hope to gain further insight into farmers' experience, to help better our understanding of how and why the bear bile industry continues to operate despite being outlawed 15 years ago, and why farmers continue to extract bile from bears despite facing potential legal sanctions. It is hoped the results of this study will meaningfully inform future efforts to end the bear bile industry in Vietnam.

Methods

Between 20/07/18 – 10/08/18, 37 questionnaires with open-ended and closed-ended questions were conducted with bear farm owners across 14 provinces in Vietnam (Figure 1). These interviews are effective for gathering data where there are a relatively small number of participants, to gain insight in to underlying processes, values and relationships (Drury, 2009; Drury, 2011). Of the 37 participants, 28 were active bear farmers and 9 were inactive. Farmers were considered inactive if they no longer kept bears or had already officially registered to give back their bears to the government and were waiting for the transition process to occur. Inactive farmers answered questions based on past circumstances where appropriate (for example, bear demographics and farm conditions). Quotas were applied so that 12 interviews were conducted at small active farms with less than 4 bears and 16 interviews were conducted at large active farms with 4 or more bears. There was no quota on farm size for inactive farms. In total, 133 bears were farmed at the active farms where interviews were conducted and 20 were kept on 9 inactive farms.

Interviews were conducted by independent market research company Cimigo. The respondents were recruited from a list of 60 bear farms provided by World Animal Protection and Education for Nature Vietnam (N=34 interviews, randomly selected [within quota brackets] from the list of 60 farms), Cimigo researcher's local knowledge (N=2 interviews) and referrals from farmers (N=1 interviews). A total of 37 farm owners agreed to participate in the study. Given that the cohort of famers interviewed was not completely random (due to selection from a list compiled by NGOs and the application of farm size quotas) caution should be applied when extrapolating the results of the survey to the industry as a whole.

The interview guide is provided as supplementary material. Questions were designed by staff from World Animal Protection and staff from Cimigo with formal training in research methodology. The survey was designed to reduce the sensitivity of potentially controversial questions but did not include specialised questioning techniques. This leads us to apply caution when interpreting the results of the questionnaire, as participant answers can be unintentionally impacted when enumerators are not extensively trained in specially designed questionnaires. However, this limitation is

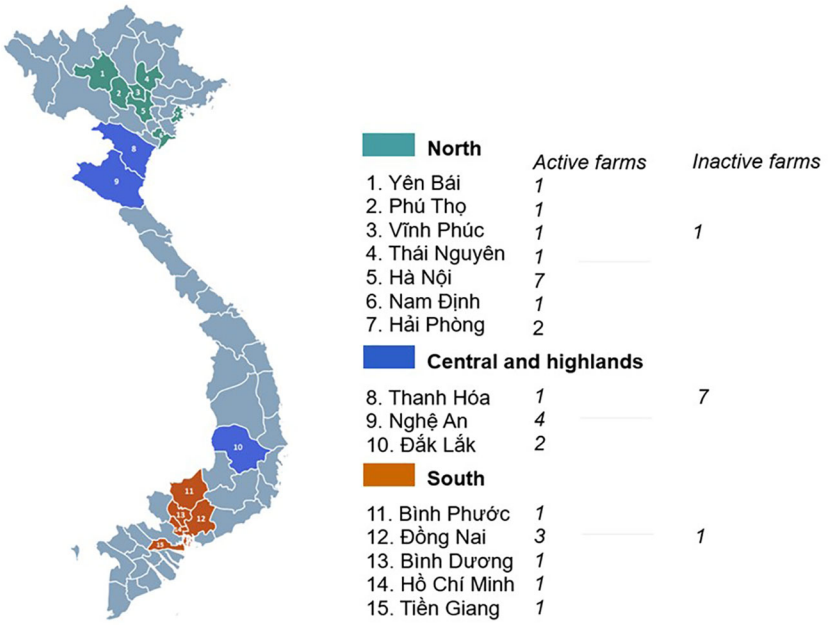

FIGURE 1
The distribution of farm locations across Vietnam, where bear famers were interviewed for this study.

partially mitigated because the farmers were informed that interviews would be anonymous and that no personal identifying information would be recorded, and that interviewers had no connection to any law enforcement authorities. Particularly sensitive questions were asked towards the end of the survey (as indicated in the interview guide in the supplementary material), to avoid any impact they may have on the farmer's answers. Every effort was made to safeguard participants, including obtaining prior consent [that participants understood they could withdraw at any time during the process] and ensuring anonymity for respondents.

The survey was presented with a mixture of closed and open-ended questions, enabling both structured responses and additional qualitative feedback. Interviews were piloted internally within Cimigo and initially trialed with several respondents from the target group. Farmers were not aware that interviewers were commissioned by NGOs during the survey and understood prior to participation that interviewers had no connection to the government, reducing the potential effect of these factors on their answers to the questionnaire. Interviews lasted an average of 40 minutes and answers were recorded by the interviewer typing on a tablet. All interviews were conducted in Vietnamese and subsequently translated into English by Cimigo staff fluent in both languages. A total of 10 researchers conducted the interviews, but only 1 researcher was present at each interview. Participant demographics are detailed in Table 1.

Questions were designed to gain a broad insight into the motivations and experiences of Vietnamese bear farmers, with the vision that improved understanding of the industry from this perspective may help inform future strategic efforts to end the bear bile farming in Vietnam. To understand the background of farmers entering the industry and the state of the current farms they are running, we asked participants about bear acquisition and farm management. For example, questions centered around the number of bears kept on farms, details about home enclosures/health of the bears and the history of the farmer's relationship with the industry. To gain some insight into the farmer's motivations for working in the industry, we asked questions about positive and negative aspects of bear keeping, including from a financial perspective. To investigate attitudes towards animal husbandry and care we investigated farmers beliefs about captive bear welfare through questions about their perception of bear's experience on the farms and during bile extraction. We also asked about the provisions of food and medical care for bears on their farms. To identify barriers for farm owners to stop keeping bears, we explored farmer's awareness and understanding of the government surrender process and prompted further discussion about engaging with the process after providing clarity by reading the information prompts. Participants were read information detailing regulations relating to hunting killing, transport, raising, possession and trading of bears or bear parts and instructions on how to surrender their bears (see Supplementary Material 1). The interview guide provides further detail about how and when this information was read to the participating farmers.

We asked about farmer's use of radio, television and social media to gain insight into which media channels they engage with, and their preferred sources for information about bear farming, to help inform future information dissemination efforts. We also investigated farmer's beliefs about the status of wild bears in Vietnam, and their knowledge about bear's natural history, to gauge the level of understanding of the wider impact of the industry on the conservation of bear species and the government's efforts to mitigate this impact. We investigated the potential of working with former farmers in future efforts to convince current bear farmers to exit the industry, by asking former farmers questions about their motivations to surrender their bears, their experience with the surrender process, and their willingness to engage with current farmers to encourage

TABLE 1 Bear farmer demographics.

		Number of famers interviewed	% of total farmers interviewed
Gender	Male	23	62%
	Female	14	38%
Age	30 - 39	2	5%
	40-49	8	22%
	50-59	15	41%
	60-69	9	24%
	70-79	3	8%
Household income (monthly)	<USD $180	1	3%
	USD $180-399	6	16%
	USD $400-599	8	22%
	USD $600-899	8	22%
	USD >$899	11	30%
	Not disclosed	3	8%

them to follow suite. These questions also contribute to understanding how to engage with diverse and opposing stakeholders in efforts to end the bear farming industry in Vietnam.

Some observational cross-checks were conducted for some questions (for example, the size of farms and number of bears), but not all questions (for example bile extraction methods and food provisions for bears). This lack of observational cross-checking partially reduced the reliability of our results but was not feasible to conduct as part of the study.

Results

Bear farm management

Table 1 details the demographics of bear farmers participating in the study. Among active bear farmers, 75% started their farms by themselves (21/28) and the remaining 25% (7/28) inherited the farms from their family. All active bear farmers have run their farms for at least 9 years and the longest running farm was 21 years. The most recent farm was started 3 years ago (in 2015) but was no longer active at the time of this study.

Half (51%) of the farmers acquired their bears from traders (19/37), 30% purchased them from friends (11/37), 11% inherited them on farms from their families (4/37) and 8% refused to answer where they acquired their bears (3/37). Most did not know the bear's origin, although some believed that they were from the province Nghe An, which borders Laos (7/37), from Laos (5/37) or from Cambodia (3/37).

The mean age of bears across active farms was 15 years. The majority of bears were male (70%) with a much smaller proportion of females (26%) and a few whose sex was not known (4%). The mean size of active farms was 75m^2, ranging from a minimum 8m^2 for 1 bear to a maximum 900m^2 for 5 bears. This figure represents the area of the whole farm, not the space available for the bears. The average size of bear cages was 5m^2 (Figure 2). Bears were kept in their cages for 24 hours a day on most farms (92%, 34/37) and all farms caged bears at night. Only 3 farmers allowed their bears in their yard during the day. The average yard size was 36m^2. Some farmers kept other wildlife, such as deer, hedgehog and pythons (16%, 6/37), but most only kept bears (84%, 31/37).

None of the farmers employed staff; farming tasks were undertaken by the owner and 46% (17/37) of farmers shared tasks with family members. The most common food provided for the bears across farms was fruit (92%, 34/37) and plants

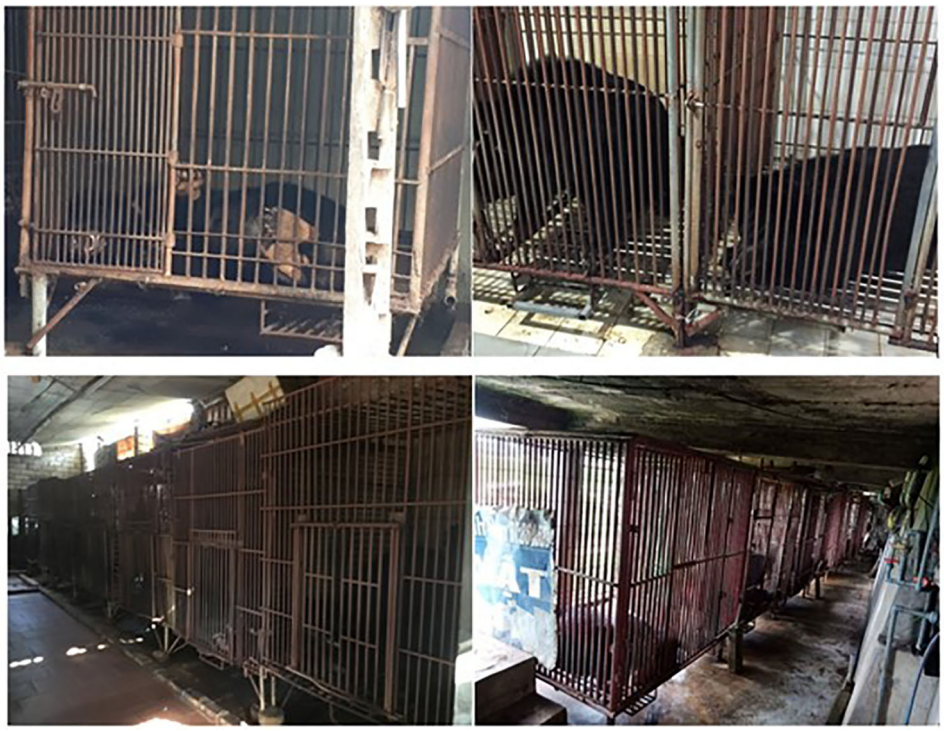

FIGURE 2
Images showing examples of bear farm enclosures across Vietnam: (top left) bear enclosures on a small farm in central Vietnam, (top right) a small farm in the south of Vietnam, (bottom left) a large farm in the north of Vietnam and (bottom right) a large farm in central Vietnam.

(81%, 30/37). Other foods such as rice bran, egg, milk and pig bone were also provided at 62% of the farms (23/37). A fewer number of farms provided insects (16%, 5/37) and small vertebrates (41%, 15,37) for the bears. Nearly half (46%, 17/37) said they checked the health of their bears each day.

Most active farmers (70%) reported to sell the bile they extract from their bears (26/37). The remaining 30% of farmers reported they used the bile for theirs and their family's personal consumption only (11/37). The farmers that sell bile extract it from their bears 4 to 5 times per year, whereas farmers that only use their bile for personal consumption extract bile once or twice per year. All farmers reported to anaesthetize their bears before bile extraction and 38% (10/26) said they use a vet or expert to extract the bile. Eight farmers (22%) stated the bear is not fed for 2 – 3 days prior to extraction and is given water with sugar after the procedure. Around half (54%, 14/26) believe the extraction process is painful and 46% (12/26) say it causes no pain at all.

Motivations for bear farming

Among farmers who started their farms by themselves (N=30), there were three key motivating factors: popularity of farming, financial gain and personal use. Popularity of farming was cited by 50% (15/30) of the farmers. Financial gain was the second strongest motivator, cited 40% (12/30) of the famers. Personal bear bile use was less common, with only 7% (2/30) of the farmers giving this reason.

Beliefs about captive bear welfare

The majority of farmers reported their bears are either happy (67%, 25/37) or very happy (27%, 10/37). Only 2% (1/37) reported their bears are unhappy and 5% (2/37) said they do not know. Farmers reported that when their bears are happy, they 'move, play, dance and jump in the cage'. Half reported they think their bears are sad if they stop playing and jumping (49%, 18/37). Other indications their bears are sad were reported as when they eat less (35%, 13/37), look tired (16%, 6/37) or continually lie down and don't wake up (8%, 3/37).

Appetite and movement are also used as indicators of sickness; farmers reported they thought bears were sick if they stopped eating (78%, 29/37) moved slowly (30%, 11/37), were not willing to play (27%, 10/37), had a dry nose (11%, 4/28) or became aggressive (3%, 1/28). Four farmers (11%, 4/37) said they did not know what indicated their bears were sick. Overall, farmers reported they considered their bears healthy (54%, 20/37) or very healthy (35%, 13/37) and said they were seldom or never sick. Over half of the farmers (54%, 20/37) had experience with sick bears in the past. The most common course of action reported was to contact the FPD to ask for advice (75%, 15/20) or to contact a vet either directly (45%, 9/20) or *via* the FPD (40%, 8/20). A small number of farmers reportedly self-medicated their bears from the pharmacy (15%, 3/20), with "tonic food, probiotics or glucose". One farmer reported they let the bear recover alone (5%, 1/20) and another sought advice from a friend (5%, 1/20).

Financial aspects of bear farming

The mean price farmers reportedly paid for their bears (N=27) was 34 million Vietnamese Đồng ($1,460USD at an exchange rate of 23,300 VND to $1USD). Farmers were reluctant to share details of financial profit but 39% (11/28) did share estimates of weekly gross revenue. Small farms (<4 bears) earn $25 USD per bear per week, compared to $29 USD on medium farms (4-8 bears) and $30 USD on large farms (>10 bears). Around 60% gross annual revenue earned pays for food and medicine for the bears. Most farmers expressed it is difficult to benefit financially from bear farming because the price of bile has decreased while general inflation has continued. Over half (54%) of active farmers reported that they make less money than a year ago (15/28).

Knowledge of bear farming regulations

Half (51%, 19/37) of farmers reported they are aware of the regulations governing bear farming. Amongst those, 68% (13/19) wrongly believed that bear farming is legal. Furthermore, only 26% (5/19) reported knowing that bears must be micro-chipped for monitoring and only 16% (3/19) reported knowing that extracting bile or killing the bears was illegal.

The future of bear farming

The vast majority (82%, 23/28) of the active bear farmers we sampled expect to continue bear farming and intend to maintain the scope of their farms. Only one farmer (with 17 bears in the north of the country) plans to extend his farm. When asked about their motivations to continue bear farming, the most common reasons cited were to extract bile to sell (62%, 23/37) or that it is popular and fun to farm bears (49%, 18/37). Of the five (18%, 5/28) active farmers that stated their intention to stop farming bears in the future, three claimed that the lower cost of bile has rendered bear farming no longer financially viable, one said they feared the government would make bear farming illegal in the future, and 1 said that he is currently surrendering his five bears because bear farming is inconvenient.

When inactive farmers were asked to share their reasons for why they no longer keep bears, 55% (5/9) said they were encouraged to free their bears. A further 33% (3/9) said they did not want to be hassled by the FPD anymore. Over half of the

former farmers interviewed (56%, 5/9) said that the FPD is the most impactful source to convince farmers to stop farming.

Bear surrender and confiscation

Knowledge about the voluntary surrender process for bears was reportedly low among active farmers (39%, 11/28), although 36% reported they were aware of other bear farm owners who had surrendered their bears (10/28). Only nine farmers reported knowing they would need to contact the local Forest Protection Department (FPD) to surrender their bears (32%, 9/28). When prompted with instructions on how to surrender (Supplementary Material 1), 32% (9/28) of active farmers felt that the process of voluntary surrender is complicated. Among the 5 farmers planning to stop bear farming in the next 5 years, only 40% (2/5) intend to surrender their bears. The remaining 3 famers intended to sell their bears to other farmers. Of the 23 farmers planning to continue bear farming, only 26% (6/23) said they would follow the government surrender process if they were to stop bear farming. Less than two thirds (61%,17/28) of active farmers reported they were aware that their bears can be confiscated if they are found extracting bile, and only 32% (9/28) reported to know of any farms that have had their bears confiscated.

Messages to dissuade bear farmers

None of the farmers interviewed in this study received information about bear farming from public media channels, despite the popularity of national TV channels such as VTV3 and VTV1, and the prevalent use of social media apps Facebook (65%, 24/37) and YouTube (41%, 15/37) among the 23 farmers with smartphones (62%, 23/37). This is likely due to the illegality of the industry in Vietnam. Instead, the most popular sources of information were other farmers (54%, 22/37) and trusted friends who have bear farming experience (65%, 24/27). Farmers also sought advice from family elders (27%, 10/37) and Forest Protection Department staff (22%, 8/37).

A third of former farmers (67%, 6/9) were willing to share their experiences with other bear keepers to convince them to stop farming. When asked to list positive aspects of life after surrendering their bears, 66% (6/9) said it had eased the time and cost burdens associated with looking after the bears, 32% (3/9) said it was cleaner without the bears and 22% (2/9) said it was safer. Farmers were asked what they thought was the most persuasive message to spread to encourage farmers to stop keeping bears. The highest percentage of farmers (24%, 9/37) thought that highlighting 'Keeping bears is cruel, government sanctuaries are a better alternative' was the most persuasive reason. This was followed by 'There is no more profit in keeping bears' (19%, 7/37) and 'It is now illegal to keep bears' (16%, 6/37). Less persuasive messages were 'Feeding and taking care of bears is too expensive and too much work', 'It has become unacceptable to keep bears', 'Giving up bear is a simple and free process, simply call your FPD' and 'The government give back my initial investment'.

Discussion

Our study provides novel insights into the motivations and experiences of Vietnamese bear farmers. Notably, we found that (1) many bear farmers reported a poor understanding of national laws and regulations governing bears and bear parts, (2) most farmers do not intend to stop farming bears and (3) the most effective method of spreading information and advice to bear farmers is *via* other farmers. Additional findings from this research correspond with related studies that adduce: (1) there is still an active bear bile market in Vietnam, despite its illegality (Crudge et al., 2018) (2) bear farming is becoming less profitable in Vietnam, assumed due to a reduction in demand and the decreasing price of bile (Wilcox et al., 2016; Crudge et al., 2018), (3) bile is still being extracted from bears between 4 and 5 times per year on Vietnamese farms (Crudge et al., 2018) and (4) farmers who no longer want to keep their bears do not always surrender their bears to the government, as they should do by law (Crudge et al., 2018).

Vietnamese bear farms

A major difference reported in our study in comparison with similar studies in the literature is the age of the bears on the farms. The mean age of bears reported in our study was 15 and several farmers claimed their bears were even older. This is a big contrast to results previously reported in the literature that the mean lifespan of bile farm bears is between 4 and 7 years due to poor husbandry and suffering from exploitative bile extraction procedures (Nguyen, 2007; Crudge et al., 2018). It is possible that the bears were poached from the wild at an older age, although this is contradictory to reports that most of the bears captured and sold to bile extracting facilities are cubs (Wilcox et al., 2016; Gomez and Shepherd, 2018). Despite the apparent low awareness of the law among respondents, it is also possible that some of the farmers interviewed in our study exaggerated the age of their bears to appear legally compliant, given that bears acquired after 2005 are not microchipped and are therefore against the law. Only 26% of bears on farms were female, indicating a highly unbalanced sex ratio. Since captive breeding usually results in only slight variations from an even sex balance, this data suggests either a higher mortality of female bears than male bears on farms, or the sourcing of bears from non-captive bred origins where a sex selection may occur.

Our results do support existing evidence in the literature that there is an active bear bile industry in Vietnam, despite this being against the law (Crudge et al., 2018; Davis et al., 2019b). We found that 70% of farmers interviewed extract bile from their bears to sell on the market. Continued extraction of bile is logical to expect from farmers who keep bears on their farms instead of surrendering them, considering the reality that bears are expensive to maintain.

Despite the number of farmers remaining active, there is evidence to suggest that the bear farm industry is in decline. Farmers commented that the price of bile has decreased while general inflation has continued, and 54% report they make less money than they did this time a year ago. This reflects studies that found bile farming in Vietnam is no longer cost effective enough to be economically viable (Wilcox et al., 2016; Crudge et al., 2018) and interview reports from (Davis et al., 2019b) that bear bile isn't as 'trendy' as it was 10 years ago. Given that 40% of the farmers we interviewed said their main motivation to farm bears was financial gain, a continued reduction in the economic viability of the industry would likely cause the closure of more bear farms. Particularly for small farms, who earn an average of $4 USD per bear per week less than large farms.

However, it is not only financial incentives that keep farmers in the industry, social-acceptability also plays a key role. Our results show that half of the farmers we interviewed said it is 'popular' and 'fun' to farm bears. Efforts should be made to reduce the social popularity of bear farming, to discourage farmers who are not put off by the declining revenue. It would also be beneficial for future studies to focus on gaining a better understanding of the chain of consumption in the bear farming industry to help understand what enables continuation of commerce despite the apparent lack of economic viability.

Bear welfare

Our interview results indicate some animal welfare concerns on Vietnamese bear farms. For example, 92% of farmers keep their bears in cages for 24 hours a day, where the average size of cages is $5m^2$. For bile extraction, 22% of farmers starve their bears for two to three days prior to the procedure and over one third of farmers (38%) believe the extraction procedure causes no pain at all. Although all farmers claim to anaesthetize their bears before bile extraction, no questions were asked about methods of anaesthesia during interviews; incorrect anaesthesia procedures can be extremely painful and stressful for animals (Flecknell, 2015).

Results also indicate that farmers misinterpret stereotypies [repetitive behaviours with no obvious goal or function (Mason, 2006)] as positive behaviours. Half of farmers reported that their bears 'move, play, dance and jump in the cage' when they are happy and stop playing and jumping if they are sad. This could indicate a misinterpretation of behaviours such as head and body bobbing, head and body weaving, and head flicking or rolling, which have been identified as abnormal behaviours commonly exhibited by captive bears on farms and are recognised as signs of chronic stress (Maas, 2000). Furthermore, when bears become sick, a quarter of farmers choose to administer medicine to their bears themselves, let the bears recover alone or seek advice from a friend, rather than seeking professional help from veterinarians or FPD.

When interpreting these results, it's important to acknowledge different cultural perceptions of animal welfare. Often, western viewpoints of what constitutes bad or good animal welfare differs greatly from viewpoints expressed in Buddhism and Confucianism (Cohen, 2013; Cao, 2018). Potential future efforts to dissuade farmers from keeping bears through the animal welfare lens may benefit from recognizing the farmer's perception of their bear's well-being as influenced by their cultural context.

Knowledge of bear farming regulations

Farmers reported a poor understanding of regulations governing bear farms. Only half of the interviewed farmers claimed to be aware of bear faring regulations, and only 16% of these reported to know that extracting bile or killing farm bears was illegal. It is possible that due to the controversial nature of this topic the farmers provided inaccurate replies about their knowledge, to ensure they did not appear to be wilfully breaking the law. Caution should be applied when interpreting our results because we did not use specialised questioning techniques designed to counteract the possibility of false answers arising from social desirability and illegality bias (Nuno and John, 2015; Davis et al., 2019a). However, we partially mitigated this by ensuring farmers understood that interviews would be anonymous, and that no personal identifying information would be recorded, and that the interviewers were not connected to the government. Therefore, it is still possible that regulations are poorly understood among farmers, as our results indicate.

If the apparent lack of knowledge among the farmers interviewed is reflective of bear farmers across Vietnam, it is likely detrimental to efforts to end the industry because it may lead to farmers continuing to extract bile without fear of potential legal penalties where they might otherwise stop. This lack of knowledge may be due, in part, to lax enforcement of the law. Provincial FPDs are only required to inspect farms at least once per year. This seems to be a scant amount of regulation, particularly given the amount of evidence that an illegal market still exists (Wilcox et al., 2016; Crudge et al., 2018; Davis et al., 2019b). One study found only 5% of respondents knew of authorities issuing fines for extracting bile (Crudge et al., 2018), and our results show that only 32% of respondents know someone who has had bears confiscated. Increased

enforcement would likely help spread the message among farmers that bile extraction is illegal and there are penalties for doing so. Such increased enforcement can be aided by technological advances, such as the implementation of improved microchip technology enabling a much easier, faster and safer process of monitoring captive bears on farms (Schmidt-Burbach and Officer, 2014), or advanced conservation marketing techniques (Smith et al., 2020).

Poor understanding of the bear surrender process could also be contributing to on-going bile extraction. Allowing farmers to keep bears on their property (providing they do not extract bile) eases the logistical challenges of breaking the law. It also creates an environment where farmers could become tempted by opportunistic bile extraction. Only 39% of bear farmers said they had a good understanding of the bear surrender process and 32% said they felt the process was complicated. This is likely to discourage farmers from surrendering their bears. The less bears that remain on farms, the less opportunity for bile extraction to occur. Increasing the incentive for bear farmers to surrender bears, either by disseminating advice about the process or by simplifying it, could be effective in reducing the amount of bile extraction occurring throughout the country.

Our findings indicate the most effective way to disseminate advice among farmers would be to reach them through other farmers. Only 22% sought advice through FPD staff and none of them use media channels like television or social media for farming matters. This is also important to consider in campaigns targeting the social acceptability of the bear bile industry. Campaigns use popular media channels to reach key audiences, such as consumers. A report by Education for Nature Vietnam found that 85% of the public that have been exposed to bear protection awareness materials/activities claimed that they had been reached through television (Education for Nature Vietnam, 2015). Because campaigns have been focused on information *via* media, farmers may have been unintentionally omitted from the messaging, so social acceptability may remain higher among this group. This further reiterates the need to develop interventions appropriate for the target audience and with cultural relevance in mind (Greenfield and Veríssimo, 2019; Randolph et al., 2019), similarly to previous efforts to limit the use of Rhino horn among Vietnamese consumers (Olmedo et al., 2018).

The future of bear farming

Despite bear farming being made illegal nearly 15 years ago, the vast majority (82%) of active bear farmers interviewed expected to continue bear farming and intend to maintain the scope of their farms. However, our results also show that 75% of the bear farmers have never considered surrendering their bears and 68% wrongly believed that bear farming is legal. Therefore, there may be an opportunity to advise and encourage farmers to consider stopping bear farming where they hadn't before.

Furthermore, 67% of former bear farmers are willing to share their positive experiences of surrendering bears with the active farmers, creating a trusted information source to promote the end of bear farming. This, in conjunction with more frequent monitoring visits by FPD staff, demand reduction strategies and reducing the social acceptability of bear bile holds potential to have a big impact on the industry. The most effective approach would likely be two-pronged, targeting both supply facing [including practitioners reportedly prescribing bear bile (Davis et al., 2019b)] and demand facing stakeholders. However, it is important to note that a wide range of social factors influence the popularity and social acceptability of bear bile products, and the complexity of demand fluctuations and subsequent demand reduction strategies cannot be underestimated.

It is imperative to ensure that ex-bear farmers and other key players in the bear farm industry do not simply switch from bear farming to other illegal trade in bear parts, for example wild poaching or smuggling, or switch to farming other wild animal species. A previous study in Vietnam reported that 46% of bear farmers admitted their customers had requested bear paws and other body parts to consume (Crudge et al., 2018) and an interview with a retired doctor from Hanoi claimed that illegal wildlife hunting still continued despite the government's protective laws (Davis et al., 2019b). Our study did not ask farmers about their thoughts on or involvement in activities related to wild bears, or their thoughts on diversifying their farms to other wild animal species, so we cannot provide further insight here. However, COVID-19 has brought about fresh and intensified scrutiny of wildlife farming, trade and consumption across the board, including within Vietnam, as demonstrated by the launch of a new taskforce committed to reforming policies to prohibit the commercial trade and consumption of wild birds and mammals (D'Cruze et al., 2020). This may indicate a shifting narrative that will impact the future of the industry.

Limitations

Our results are based on self-reported answers from interview participants. Given that bear farming is illegal in Vietnam, it is possible that reluctance to admit illegal activity could influence the answers given. Davis et al. (Davis et al., 2019a) found that interview participants in Cambodia under-reported consumption of bear parts due to concerns about punishment or facing legal action. We did not apply specialised questioning techniques designed to counteract the possibility of false answers arising from social desirability and

illegality bias (Nuno and John, 2015; Davis et al., 2019a). Therefore, it is possible that farmers' answers may have been altered to appear more legally compliant and do not give a true reflection of their experience. This limitation is partially mitigated because the farmers were explicitly told interviews would be anonymous and that no personal identifying information would be recorded. Additionally, there does not appear to be much social stigma surrounding use of bear products in Vietnam (Davis et al., 2019b). Future studies with similar aims and objectives would benefit from extensive enumerator training, more sophisticated questioning techniques and a greater consideration of how psychosocial attributes are investigated and discussed in such contexts.

There could also be potential bias in in the approach used to recruit participants, because the initial list of farms provided to market research company Cimigo was compiled by two animal welfare/conservation NGOs who are involved with campaigns to end bear bile farming. However, the list was comprised of all known bear farms and was not limited to farms that had previous engagement with the NGOs or their campaigns. Additionally, all contacts with the farms and the random [within quota brackets] selection of farms to approach was carried out by Cimigo, who have had no previous involvement with bear farming campaigns and no specific interest in animal welfare or conservation. They therefore provided an objective approach to farm selection.

Lastly, we recognise the limitations in not representing Vietnamese perspectives in the interpretation of our results. Although we employed a Vietnamese market research company to conduct the interviews and collect the data from the farmers, we acknowledge that a lack of Vietnamese voices in the authorship of the paper may impact its validity and that local perspectives are important when addressing issues in a society the researchers are removed from. In future we will endeavour to include local collaborators for further research on this topic.

Conclusions

Our study demonstrates that while the economic viability of bear farming appears to be decreasing throughout Vietnam, an illegal market continues to operate. The social acceptability of bear bile, in conjunction with an apparent poor understanding of legislation among farmers and little evidence of penalties applied to law breakers could all be contributing factors enabling this industry to linger. The law that allows farmers to keep bears providing they don't extract bile from them creates a legal loophole that eases the logistical challenges of breaking the law and should be considered a catalyst for the continuation of this industry.

Messaging campaigns increasing the level of understanding of the bear surrender process among farmers using ex-bear farmers to disseminate information may help facilitate phasing out the industry. While focusing efforts to end the last of bear bile farming, farmers and other key industry players should be cautiously monitored to ensure that the end of bile farming does not simply lead to a diversification of illegal wildlife exploitation. National interventions that increase social stigma around the consumption of bile and more broadly the consumption of wild animal products, and campaigns aimed at influencing consumer behaviour, are key to avoiding this industry shift.

The bear farming industry in Vietnam has decreased significantly over the last decade, but the attitudes of many farmers who show no intention to stop bear farming serves to demonstrate that further interventions will be necessary to close the market completely.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary Material. Further inquiries can be directed to the corresponding author.

Ethics statement

Ethical review and approval were not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

Author contributions

Conceptualization, JS-B, KK and EG. Methodology, JS-B, KK, and EG. Data curation, JG. Writing—original draft preparation, JG. Writing—review and editing, JG and JS-B. Supervision, JS-B. Project administration, JG, JS-B, KK and EG. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fcosc.2022.913263/full#supplementary-material

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