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The Future of Upland Sheep Farming, Finding the Balance; Production, Nature Conservation and Climate Change

Written by:

Dan Jones NSch

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A NUFFIELD FARMING SCHOLARSHIPS REPORT

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Date of report: July 2025

*"Leading positive change in agriculture.
Inspiring passion and potential in people."*

Title	The Future of Upland Sheep Farming, Finding the Balance; Production, Nature Conservation and Climate Change.
Scholar	Dan Jones
Sponsor	The John Oldacre Foundation
Objectives of Study Tour	To explore how upland sheep farmers across diverse regions are balancing productivity with environmental sustainability, climate adaptation, and cultural heritage, and to identify practical approaches that could inform the future of sheep farming in the UK.
Countries Visited	USA, Brazil, France, Latvia, Chile, Argentina, Malaysia, Taiwan, Japan, Poland, Italy.
Messages	• Upland sheep farming plays a critical role not just in food production, but also in nature conservation, climate resilience, and cultural heritage. • Farmers worldwide are adapting to climate change and policy pressures by adopting sustainable grazing systems, diversifying their practices, and delivering public goods such as fire risk reduction, vineyard maintenance, and solar farm grazing. • These examples show that sheep farming can work with the environment - not against it. • Supporting this multifunctional role through policy, funding, and knowledge exchange is key to keeping upland farming systems viable, valued, and vibrant for future generations.

EXECUTIVE SUMMARY

This report explores the evolving role of upland sheep farming in addressing the interconnected challenges of food production, nature conservation, climate change, and cultural preservation. Through a Nuffield Farming Scholarship, I conducted an international study tour across 11 countries - including the UK, Chile, Argentina, Japan, and the USA - interviewing 50 farmers and agricultural experts engaged in a wide range of grazing systems. These conversations revealed diverse, innovative approaches to sustainable sheep farming, offering lessons relevant to the future of upland agriculture in the UK.

Key findings highlight that farmers globally are embracing practices such as rotational and conservation grazing, integration with biodiversity goals, and the delivery of public goods services. In the USA, sheep are being used for fire risk reduction, vineyard maintenance, and vegetation management under solar panels - examples of multifunctional land use that combine agricultural output with environmental benefit.

Climate change was the most frequently cited challenge, with farmers reporting increasingly extreme and unpredictable weather patterns. Many are responding by breeding more resilient livestock, diversifying their systems, and adopting low-impact, adaptive management techniques. This aligns with a growing mindset of farming “to the optimum, not the maximum.”



Cultural identity also emerged as a key theme. In regions like Wales, sheep farming is inseparable from language, tradition, and rural community life. Farmers expressed concern that the loss of small farms risks eroding not just food production capacity but also centuries-old

Figure 1: Managing the hill flock on the Great Orme, overlooking the North Wales coast. Photo: the author.

knowledge, skills, and cultural continuity. These sentiments were echoed in communities as far afield as Patagonia and rural Japan.

The report advocates for policies that support the multifunctional role of upland sheep farming, recognising it as a provider of food, biodiversity management, cultural heritage, and climate resilience. Financial support for conservation-focused grazing, funding for public good delivery, and stronger farmer-to-farmer knowledge exchange are identified as crucial steps forward.

Drawing on both global insight and my own experience farming on the Great Orme in North Wales, I conclude that the future of upland sheep farming lies in adaptation, diversification, and cultural connection. By working with the land, rather than against it, sheep farmers can continue to be stewards of both productive landscapes and the rural heritage that shapes them.

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Nuffield Farming Scholars are available to speak to NFU Branches, agricultural discussion groups and similar organisations.

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CHAPTER 1: INTRODUCTION



Figure 2: Dan Jones, the author pictured somewhere at the end of the world, on horseback in Tierra del Fuego, Southern Chile. Moving 21,000 ewes across Patagonia's wild landscape is living proof that a Nuffield Scholar will go a long way for a good sheep story! Photo: author's own.

Upland sheep farming is a crucial part of agriculture in the UK, playing a significant role in environmental stewardship, economic sustainability, and cultural heritage. As a tenant farmer of the National Trust at Parc Farm on The Great Orme, I have experienced firsthand the impact that traditional farming practices have on maintaining the delicate balance between agricultural productivity and nature conservation. The Great Orme, recognised as a Site of Special Scientific Interest (SSSI), is not only a habitat for rare flora and fauna but also a landscape that draws over 600,000 visitors each year. This unique setting demonstrates the importance of sustainable farming practices that contribute to biodiversity conservation while supporting rural economies.

The significance of this research extends beyond local landscapes; it addresses critical national issues such as food security, rural development, and climate resilience. In the face of challenges such as climate change and increasing urbanisation, upland sheep farming represents a sustainable approach to land management that can preserve vital ecosystems while producing high-quality food. The traditional methods employed by farmers like me, which include the use of Welsh Mountain and Herdwick sheep and conservation grazing, are essential for maintaining the health of upland habitats and ensuring that these landscapes continue to thrive for future generations.

My motivation for this research is rooted in a commitment to safeguard our agricultural heritage while adapting to modern environmental challenges. Following the Foot and Mouth crisis in 2001, which significantly reduced sheep numbers and led to detrimental ecological changes, I recognised the urgent need for effective conservation strategies. This realisation has driven my involvement in developing grazing plans that set agricultural goals with outcomes that ensure increased biodiversity, ensuring that our farming practices contribute positively to the environment.



Moreover, this research highlights the critical role of farmers as land managers, which support the integration of sustainable practices that can benefit both local communities and the wider landscape. By engaging with organisations such as the National Trust and Natural Resources Wales, I aim to have a farming system that works for farming and the environment. This study seeks to contribute to national discussions on sustainable agriculture, illustrating how upland sheep farming can serve as a model for balancing productivity with conservation in a rapidly changing world.

In conclusion, the exploration of upland sheep farming practices is not only an academic exercise; it is vital for the future of agriculture in the UK. By understanding and promoting sustainable practices, we can ensure that farming continues to play a pivotal role in shaping our rural landscapes, supporting biodiversity, and preserving cultural identities for generations to come.



CHAPTER 2: LITERATURE REVIEW

Sheep grazing has long been a vital part of upland ecosystems, biodiversity and cultural landscapes. In the North Atlantic region, sheep grazing plays a crucial role in both agriculture and cultural practices. Ross et al. (2016) showed that while sheep farming is essential for rural economies, it can lead to significant environmental consequences, particularly in fragile ecosystems. Their study indicates that when financial support is linked directly to the number of sheep produced it has a detrimental effect on sustainability and nature. To address these challenges, the authors recommend management policies that promote appropriate grazing sheep numbers and area-based subsidy systems, which not only minimise environmental degradation but also can encourage biodiversity and preserve nature conservation. These findings are particularly relevant to my research on upland sheep farming, where the integration of production and conservation is critical.

Sheep grazing has long been integral to upland ecosystems, particularly in Wales, where the history of sheep farming dates back centuries.

The upland regions of Wales have a rich tradition of pastoralism, with sheep farming playing a vital role in shaping both the landscape and cultural identity of rural communities. Historically, breeds like the Welsh Mountain sheep have been bred for their hardiness and adaptability to the rugged terrain, making them well-suited for the harsh climatic conditions of the region. This tradition of upland sheep farming has not only provided livelihoods for generations but has also contributed to the conservation of unique habitats and biodiversity. However, as noted by Pollock et al. (2013) in their study, the decline in traditional livestock grazing raises concerns about biodiversity impacts. The authors highlight that traditional livestock grazing is decreasing globally, prompting worries about its effects on both rare and common species as well as overall vegetation structure. Their research employs a participatory approach to develop biodiversity indicators that can be effectively measured in rangeland environments. The study reveals that reducing sheep grazing can lead to an increase in certain vegetation types, such as dwarf shrubs. The findings suggest that while some expected outcomes aligned with professional predictions, others, such as the decline in rough grasses, did not. This highlights the necessity for nuanced management strategies that consider various species interactions and ecological contexts. Pollock et al.'s work underscores the importance of adaptive management in sheep farming, providing insights that can inform sustainable practices in upland agriculture, especially as farmers seek to balance production with conservation efforts.

Extensive sheep grazing has also historically shaped the biodiversity of Iberian natural steppes, helping steppe bird abundance (Traba & Pérez-Granados, 2022). However, from 1992 to 2020, a significant decline in sheep numbers (37.3%) has

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coincided with dramatic reductions in steppe bird populations. Using datasets from the Spanish Ministry of Agriculture and the Common Bird Monitoring Program, they found a strong positive relationship between sheep abundance and trends in the Farmland Bird Index and the Natural Shrub-steppe Bird Index. These findings suggest that grazing practices are crucial for supporting biodiversity, leading the authors to recommend that changes in the Common Agricultural Policy to prioritise extensive grazing as a key factor in conservation strategies.

Tallowin et al. (2005) demonstrate that grazing management significantly influences the biodiversity of lowland neutral grasslands. Their study reveals that lower grazing pressure on species-rich grasslands effectively maintains biodiversity and promotes positive indicator species over time. However, the findings also indicate that grazing alone may not be sufficient to achieve all biodiversity objectives, as there was an increase in pernicious weeds and no notable enhancement of positive indicator species. This highlights the need for integrated management strategies that combine grazing with additional interventions to increase biodiversity.

The findings from Traba and Pérez-Granados (2022) further illustrate the potential of sustainable grazing to enhance biodiversity, while Tallowin et al. (2005) underline the importance of grazing management in maintaining ecosystem health.

The cultural significance of sheep farming is illustrated by Welstead (2021), who discusses the English Lake District's designation as a UNESCO World Heritage Site, recognising traditional farming practices, particularly shepherding, in shaping the landscape. The chapter emphasises the influence of literary figures like William Wordsworth and Beatrix Potter on the cultural context of sheep husbandry in the region. Contemporary shepherds, such as James Rebanks, continue this legacy, emphasising the importance of traditional breeds like Herdwick. This reflects the broader cultural narratives that link sheep farming to community identity and environmental stewardship.

A study by Martin-Jones et al. (2009) explores the literacy practices of young bilingual speakers in North Wales pursuing vocational training in agriculture. Their research reveals how these individuals utilise both Welsh and English literacy in agricultural work, highlighting the interplay between language, culture, and economic opportunities. The authors emphasise the importance of incorporating bilingual literacy in vocational training programmes to enhance cultural identity and support sustainable rural livelihoods.

Follett et al. (2024) further explore farmer attitudes towards sustainable farming practices in rural Wales, highlighting the recognition of land management impacts on water quality and climate change. Their research identifies significant barriers to sustainable actions, such as concerns about return on investment and extreme weather events. Decision-making processes among farmers emphasise

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community discussions, which are crucial for balancing agricultural needs with environmental stewardship. The authors demonstrate the importance of bilingual communication and farmer-to-farmer knowledge transfer in facilitating the adoption of sustainable practices, illustrating how cultural and social factors are intertwined with environmental sustainability.

Sa Rego et al. (2022) examine the role of mountain sheep pastoralists in Northern Portugal, showing the concept of multifunctionality within European agriculture. The study reveals that traditional pastoralists often resist entrepreneurial narratives that prioritise commercial viability over their cultural identity. This resistance highlights the need for tailored narratives that recognise the worth in environmental contributions of traditional pastoralists. Such insights are critical for informing policies aimed at supporting sustainable pastoral practices and preserving cultural heritage, which resonates with broader discussions on the importance of sheep farming in rural cultures.

Studies like those by Pollock et al. (2013) and Ross et al. (2016) emphasise the necessity for adaptive management strategies that not only ensure the sustainability of sheep farming practices but also acknowledge the cultural significance of these practices within rural communities.

Furthermore, the work of Martin-Jones et al. (2009) and Follett et al. (2024) reinforces the significance of bilingual communication and community engagement in fostering sustainable agricultural practices. This integrated approach is essential for addressing the challenges faced by traditional sheep farmers, particularly in the context of climate change and changing agricultural policies.

Overall, this literature review shows the critical need for a holistic understanding of the role of sheep farming in cultural heritage and environmental conservation, guiding future research and policy-making efforts aimed at supporting sustainable practices in upland sheep farming.



CHAPTER 3: METHOD

This research employed a qualitative design to investigate the impact of upland sheep farming systems. It aimed to explore the perspectives of farmers on sustainable practices and the role they play between agricultural productivity and environmental conservation. The study was informed by a comprehensive international study tour conducted as part of my Nuffield Farming Scholarship, during which I travelled to Argentina, Chile, France, Italy, Poland, Taiwan, Japan, Borneo, Brazil, and the USA. Engaging with farmers and agricultural experts across these diverse regions provided valuable insights into global sheep farming practices, informing the qualitative approach of this study.

A total of 50 in-depth interviews were conducted with sheep farmers from the UK and the countries visited during the scholarship. Participants were selected based on their experience in the farming world and their willingness to share their insights regarding their own agricultural practices. The aim was to include a diverse range of voices that captured different perspectives on the challenges and opportunities.

Data was collected through semi-structured interviews and informal discussions. The interviews began with open-ended questions to encourage participants to share their experiences freely. Once a greater understanding of the farming systems was established, more structured questions followed. Each interview lasted between one to four hours. The interviews were recorded by note taking, pictures and some were audio recorded if the farmers were comfortable. Each interview or farm visit was then analysed and further notes were made after the visit.

The interviews were complemented by observations made during farm visits, where I documented practices, farm conditions, and interactions among farmers. This flexible and easy going approach allowed for a better connection with the farmers and understanding of the context in which sheep farming operated.

Data analysis occurred throughout the study. Interview transcripts, field notes, and any quantitative data collected were organised using a traditional note form. Themes were identified based on recurring patterns and insights from the data, with connections made between categories to get a better understanding of the potential future of upland sheep farming systems.

A coding scheme was developed to categorise the data into major themes and subthemes, allowing for a structured analysis; these major themes were production, conservation, climate change and culture. The analysis also considered the two biggest influences on systems which were climate change and government policy, on farmers' decision-making processes.



Several practical obstacles and limitations were acknowledged within the research design. The research accounted for the priorities of farmers and their perspectives on production, nature conservation, and climate change. Additionally, the effects of farm topography and climate were considered. It was essential to recognise that the findings could be influenced by the unique characteristics of each farming system, and comparisons between different systems were approached with caution.

The study focused on gathering primary data through interviews, questionnaires, firsthand discussions, and on-farm observations. This mixed-methods approach ensured a comprehensive understanding of the various factors influencing upland sheep farming practices. Information obtained from previous surveys, such as carbon audits, was also analysed to serve as performance indicators of individual farm systems, although these were not used for direct comparisons between farms.

During my interactions with farmers, it became increasingly evident how deeply intertwined farming practices and local cultures are in upland areas of the UK and across the globe. This realisation prompted me to expand my line of questioning to explore the cultural dimensions of farming. I included specific questions about how farmers perceive their roles in preserving local traditions and identities, and how the potential loss of farmers could impact cultural heritage. Farmers expressed concerns that as agricultural practices evolve and the number of active farmers declines, so, too, would the traditional knowledge, skills, and community bonds that have been cultivated over generations. This cultural perspective is vital, as it highlights the significance of maintaining farming not just as an economic activity but as a crucial element of cultural identity and community resilience. By integrating these questions into my interviews, I aimed to capture the relationship between agriculture, or more specifically – sheep farming and culture, providing an understanding of the role of upland sheep farming in sustaining both the environment and cultural heritage.

This methodological approach was used because it is a tried-and-tested approach, utilised by past Nuffield Scholars, emphasising the importance of personable conversations and farm visits in gathering quality data. By fostering open, friendly dialogue with farmers, the research aimed to capture the realities of sheep farming.



CHAPTER 4: RESULTS

The research involved in-depth personal discussions with 50 farmers across diverse agricultural landscapes in the UK, Argentina, Chile, France, Italy, Poland, Taiwan, Japan, Borneo, Brazil, and the USA. These conversations yielded rich insights into their farming practices, particularly in relation to production, nature conservation, climate change, and the cultural significance of their work.

4.1 Challenges

The column chart overleaf illustrates the most frequently mentioned concerns and challenges expressed by farmers during the interviews conducted for this research. As evident from the chart, “weather extremes” emerged as the predominant concern, with 41 farmers identifying it as a significant challenge affecting their farming practices. This highlights the profound impact that climate variability has on agricultural operations, with many farmers reporting difficulties in managing their livestock and crops due to unpredictable weather patterns.

Following weather extremes, “labour issues” were cited by 27 farmers, indicating a widespread challenge in securing a reliable workforce. This concern is particularly pertinent in the context of peak farming seasons, such as lambing, where skilled labour is crucial for productivity.

Additionally, “financial constraints” and “market access” were mentioned by fewer farmers, with five and four mentions respectively. While these issues may not be as prevalent as concerns about weather extremes or labour, they nonetheless represent significant barriers that can limit farmers' ability to adopt sustainable practices and achieve long-term viability.

Overall, this chart shows the complexity of the challenges faced by upland sheep farmers, reflecting a blend of environmental, economic, and social factors that require attention and support within the agricultural sector.

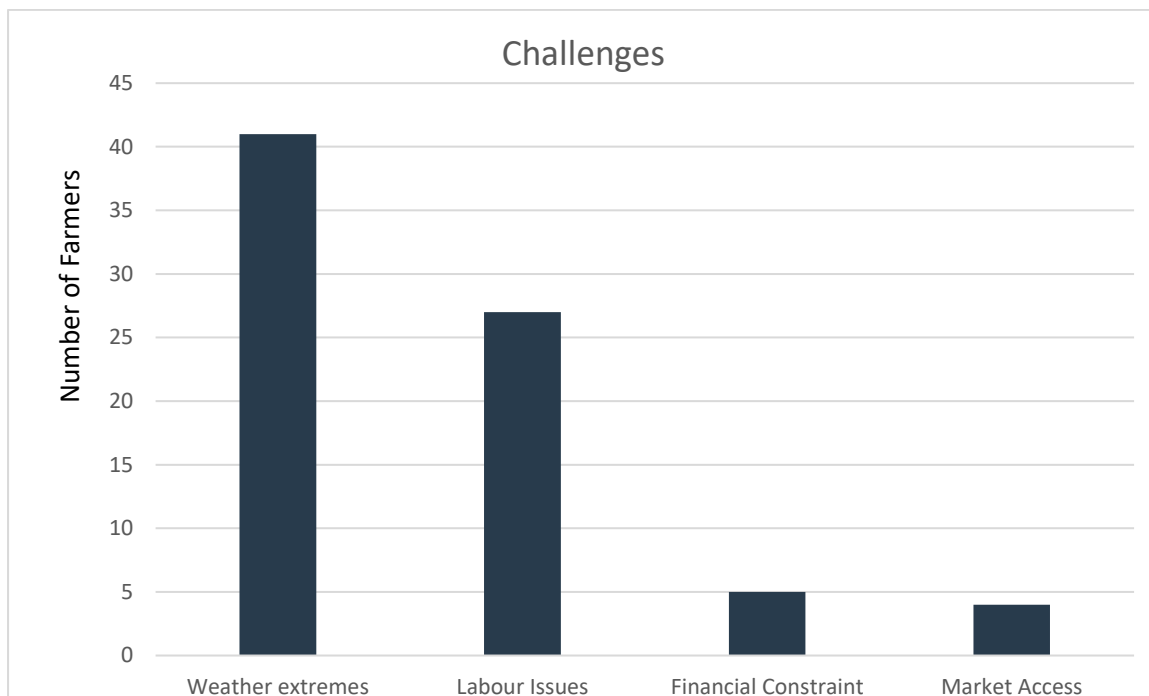


Figure 3: The most frequently mentioned concerns and challenges expressed by farmers during one-to-one interviews. Source: the author.

4.2 Production

Farmers from different countries shared a common focus on improving production efficiency while maintaining the health of their ecosystems. In Chile, for instance, many sheep farmers are adopting rotational grazing techniques, which not only enhance pasture health but also increase lamb production. One farmer noted, "By rotating our grazing areas, we allow the grass to recover, which leads to healthier ewes and better-quality lambs."

In contrast, farmers in France highlighted the importance of integrating traditional methods with modern technology. A farmer from the Loire Valley explained how precision agriculture tools are being used to monitor soil health and optimise feed efficiency, stating, "We can now adjust our feed inputs based on real-time soil data, improving both our yields and environmental impact."

Farmers in Borneo, who primarily engage in mixed farming systems, emphasised the diversity of production strategies. They maintain a variety of livestock alongside crop production, which helps mitigate risks associated with market fluctuations. A farmer explained, "Having both crops and livestock provides us with multiple income streams and makes us less vulnerable to price changes in the market."



4.3 Nature conservation

Many farmers expressed a strong commitment to nature conservation, recognising the vital role they play in maintaining biodiversity. In Chile, farmers participate in initiatives to restore native grasslands that have been degraded due to overgrazing. A farmer involved in these efforts shared, "We are working with local NGOs to reintroduce native plant species, which not only benefits the ecosystem but also improves the quality of our grazing lands."

Similarly, in the USA, farmers in Texas are implementing conservation practices such as cover cropping and integrated pest management. One farmer described how these practices have led to healthier soils and increased biodiversity on their farms: "Using cover crops has not only improved our soil health but also attracted beneficial insects that help control pests."

In Japan, the concept of Satoyama - where agriculture and natural ecosystems coexist together - was frequently mentioned by farmers. They practice traditional methods that promote biodiversity, such as maintaining hedgerows and small ponds, which support various wildlife species. A farmer remarked, "Our farming practices are designed to work with nature, not against it. This balance is essential for our community's well-being."

In Argentina and Chile, government agencies have implemented a systematic approach to managing sheep grazing on the Patagonian steppe, focusing on the balance between livestock production and environmental conservation. These agencies conduct regular assessments of plant growth to determine the potential for native vegetation recovery in natural unimproved grasslands. By measuring plant health and growth rates, they establish guidelines for sustainable grazing levels that ensure the ecosystem remains healthy and productive, benefiting the sheep farming system and nature.

Sheep farmers are typically advised to stock their land at about 85-90% of the grazing capacity recommended by these agencies. This conservative stocking rate is essential, particularly due to the region's vulnerability to extreme weather events, such as prolonged droughts. Farmers recognise that overgrazing can lead to significant degradation of the grasslands, with recovery times for natural grasses estimated to take 20-30 years after such events. By adhering to these guidelines, farmers can effectively manage their flocks while also protecting the native flora, allowing it to flourish alongside livestock production.

This sustainable grazing practice has become the norm for sheep farmers on the Patagonian steppe, illustrating a successful model of balancing agricultural productivity with environmental stewardship. The collaboration between farmers and government agencies shows how informed management decisions can lead to beneficial outcomes for both the agricultural community and the surrounding ecosystems. By prioritising the health of the land, these farmers not only secure



their livelihoods but also contribute to the conservation of the unique biodiversity found in the Patagonian steppe.

4.4 Climate change

Climate change was a significant concern among all farmers interviewed. The majority of farmers reported experiencing increased weather extremes as a direct result of climate change, which has prompted them to actively seek ways to adapt their practices. Many are focusing on breeding more climate-resilient ewes that depend less on supplemental feeding and are better suited to withstand challenging weather conditions. In Taiwan, farmers are experimenting with climate-resilient crop varieties and adopting water-saving technologies to cope with increasingly erratic rainfall patterns. A rice farmer noted, "We have to adapt to the changing weather. By using drought-resistant varieties, we can ensure our yields even in dry years", something that sheep farmers can learn from.

Farmers in Italy highlighted the importance of agroforestry systems, where trees are integrated into pastures to provide shade and improve soil moisture retention. A farmer explained, "Planting trees in our pastures helps protect our sheep from heat stress and contributes to carbon sequestration. It's a win-win for us and the environment."

Farmers in Poland are implementing adaptive measures by diversifying their livestock breeds to enhance resilience to climate variability. One farmer shared, "By raising hardier breeds, we can better withstand the challenges posed by climate change, ensuring our livestock remain healthy and productive."

Many farmers also expressed a willingness to contribute to climate change mitigation, provided that sustainable practices could be integrated into their existing systems. One farmer stated, "The key to finding the balance is to farm to the optimum rather than the maximum," emphasising the need for efficiency rather than overproduction.

Despite the challenges posed by climate change, farmers across the globe are committed to adapting their practices and contributing to environmental sustainability. They recognise that through thoughtful management and innovative practices, they can enhance both their productivity and their land management.

4.5 Cultural identity

Throughout the discussions, farmers consistently emphasised the cultural significance of their farming systems. In Wales, sheep farming is not only an economic activity but also a crucial part of the national identity. A farmer proudly stated, "Sheep farming is in our blood; it connects us to our ancestors and our land."



4.6. Utilisation of sheep for public goods services

During my visits to various sheep farms in the United States, I observed innovative practices where sheep are utilised not just for meat and wool production, but also for providing valuable public goods services. These practices demonstrate how integrating sheep farming with other land uses can contribute to environmental management and people's wellbeing.

4.6.1. Fire grazing



Figure 4: Sheep grazing on dry hillside vegetation in Ojai, California as part of a targeted fire management strategy. Photo: author's own.

One of the most compelling applications of sheep grazing is in fire management. Farmers in California, for instance, employ sheep for fire grazing, a practice aimed at reducing fire hazards in vulnerable landscapes. By grazing on dry grasses and other vegetation that can serve as fuel for wildfires, sheep help mitigate the risk of uncontrolled fires. A farmer I spoke with noted, "Using sheep to manage our pastures has significantly reduced the amount of dry material that could ignite during fire season. It's a natural way to protect our land and community." This proactive approach not only enhances fire safety but also supports the health of the ecosystem by preventing the overgrowth of invasive species.

4.6.2. Vineyard grazing

In addition to fire management, sheep grazing is effectively utilised in vineyards across the USA, particularly in regions like California's wine country. Farmers are integrating sheep into vineyard management systems to control weeds and maintain a clean vineyard floor. This practice reduces reliance on chemical herbicides and machinery, leading to a more sustainable approach to land management. One vineyard owner shared, "The sheep not only keep the weeds in check but also help fertilise the soil with their manure. It's a massive bonus for



us and the environment." This highlights the multi-use of sheep grazing, as it benefits both agricultural productivity and ecological health.



Figure 5: Sheep from Laos Sheep Outfit grazing in a Californian vineyard. This targeted grazing approach supports sustainable vineyard management by controlling weeds naturally and enriching the soil, reducing reliance on chemicals and machinery. Photo: author's own.

4.6.3. Solar panel grazing



Figure 6: In Texas, sheep are used to graze beneath solar panels as part of a land management strategy that reduces the need for mowing and chemical weed control. This dual-use approach supports both clean energy production and sustainable agriculture. Photo: author's own.

Another innovative practice observed was the use of sheep grazing in solar farms. Sheep are used to graze the grass around solar panels, which helps manage vegetation growth while providing an additional revenue stream for farmers. The American Solar Grazing Association promotes this practice as a sustainable solution that combines renewable energy production with agricultural activity. A farmer managing

a solar farm stated, "Grazing sheep here allows us to keep the area tidy without the need for mowing, and it provides a source of income from the wool and lambs." This approach illustrates how sheep farming can complement solar energy initiatives, contributing to a more sustainable agricultural and energy landscape.



CHAPTER 5: DISCUSSION

The results of this research show the potential multi-purpose role of upland sheep farming in addressing environmental, economic, and cultural challenges. The insights gained from farmers across various regions, particularly in the USA, reveal innovative practices and a strong commitment to sustainable agricultural methods that can serve as models for other regions, including the UK. This discussion will explore the implications of these findings in relation to production practices, environmental stewardship, climate change adaptation, and cultural identity.

One of the key themes that emerged from the interviews is the necessity of balancing agricultural productivity with environmental sustainability. Farmers reported adopting various management practices aimed at optimising sheep production while contributing positively to the environment. For instance, the use of sheep for fire grazing, vineyard maintenance, and solar panel grazing illustrates how livestock can be integrated into different land-use systems to enhance ecological health. These practices not only mitigate risks associated with wildfires and invasive species but also demonstrate the potential for sheep farming to provide public goods services.

The findings align with the growing recognition of multifunctionality in agriculture, where farming systems are designed to deliver multiple benefits beyond just food production. The experiences of farmers in California, who utilise sheep for fire grazing, highlight a proactive approach to land management that can preserve both agricultural and ecological health. Similarly, vineyard owners who integrate sheep into their operations benefit from reduced weed pressure and improved soil health, reinforcing the idea that sustainable practices can work with economic viability.

Climate change emerged as a significant concern among farmers, with many reporting experiences of extreme weather events that challenge traditional farming practices. The results indicated a clear trend towards breeding more climate-resilient sheep and adopting practices that enhance efficiency and sustainability. This focus on resilience is critical, as changing climatic conditions pose a direct threat to agricultural productivity and nature conservation.

Farmers' willingness to adapt their practices - such as using carbon calculators to assess emissions and adjusting grazing practices in response to climate variability - demonstrates a proactive mindset. The statement from one farmer about finding the balance by "farming to the optimum rather than the maximum" encapsulates a broader philosophy within the agricultural community focused on sustainability. Rather than pushing for maximum production at the expense of the environment, these farmers are prioritising long-term viability, which is



crucial in the face of climate uncertainty, “farm like we are going to be here forever” was one Mid-Walian farmer’s motto.

The integration of traditional knowledge and modern practices can play a significant role in this adaptation. For instance, the experiences shared by farmers in Patagonia regarding their cautious grazing practices reflect a deep understanding of their land and its limitations. Such insights can inform broader agricultural policies that support sustainable practices while recognising the importance of local knowledge in managing climate risks.

Throughout the discussions, farmers consistently emphasised the cultural significance of their farming systems. In Wales, sheep farming is not only an economic activity but also a crucial part of the national identity. A farmer proudly stated, “Sheep farming is in our blood; it connects us to our ancestors and our land.” This deep-rooted connection reflects the historical and cultural narratives that shape agricultural practices within the country.

In Wales, the Welsh language is intricately linked to the cultural heritage of sheep farming, serving as a vital component of the region’s identity. As noted by many farmers during the interviews, the language is not only a means of communication but also a means for expressing the values and traditions embedded in rural life. In Wales, sheep farming is often seen as the backbone of the Welsh language, with terms and expressions related to pastoralism deeply rooted in the local dialect. This linguistic connection reinforces the importance of traditional farming practices, as the loss of farmers would not only threaten agricultural sustainability but also jeopardise the continued use of the Welsh language. As one farmer articulated, “Our language reflects our way of life; if we lose our farms, we risk losing our culture and the stories that come with it.” This shows the need for policies that support both the agricultural sector and the preservation of the Welsh language, highlighting the interconnectedness of cultural identity and environmental stewardship in sustainable farming practices.

In Brazil, the cultural identity of farmers is closely tied to the concept of ‘caipira,’ or rural life, where the values of community and sustainability play a vital role. A farmer described how their farming practices reflect their cultural values: “We don’t just farm for profit; we farm to maintain our way of life and protect the environment that supports us.” This highlights the important link between agricultural practices and the preservation of cultural traditions that define rural identities.

Moreover, in Japan, the integration of sheep farming with local festivals and traditions showcases the cultural significance of pastoralism. Farmers often participate in community events that celebrate the sheep and their role in the local economy. One farmer shared how their sheep are part of community festivals, stating, “Our sheep symbolise our connection to the land and our heritage.”



Despite the challenges posed by modern agricultural demands and climate change, farmers across the globe express a strong desire to retain their cultural identity through their practices. The conversations revealed a shared understanding that the loss of farmers would not only threaten food production but also erode the cultural fabric of rural communities.

The insights gained from these discussions emphasise the need for policies and practices that support the culture of farming. By recognising the importance of cultural identity in agriculture, we can better advocate for sustainable practices that help both the environment and the communities that depend on it.

Ultimately, this research highlights that upland sheep farming is not merely a business; it is a vital component of cultural heritage that deserves recognition and support in the face of modern day challenges.

The results of this study emphasise the importance of developing policies that support sustainable sheep farming practices while recognising their cultural significance. As climate change and environmental degradation threaten traditional farming systems, it is essential for policymakers to engage with farmers and incorporate their insights into the design of agricultural programmes. Supporting initiatives that promote sustainable grazing practices, provide financial incentives for conservation efforts, and enhance community engagement will be vital for fostering resilience in the agricultural sector.

Furthermore, the integration of innovative practices, such as solar grazing and fire grazing, should be encouraged through funding and technical support. By highlighting successful case studies, such as those observed during the Nuffield Farming Scholarship, stakeholders can promote the adoption of these practices across different regions, demonstrating the potential for sheep farming to contribute to both environmental health and economic sustainability.

The research also points to the need for ongoing education and knowledge transfer among farmers. Collaborative efforts that facilitate farmer-to-farmer exchanges of best practices can enhance the capacity of rural communities to adapt to changing conditions, by fostering a culture of learning and innovation.



CHAPTER 6: CONCLUSION

The findings from this research demonstrate the intricate balance that upland sheep farming must achieve between production, nature conservation, and climate change adaptation. As demonstrated through interviews with farmers across various regions, including the UK and the USA, sustainable sheep farming practices not only enhance agricultural productivity but also play a crucial role in environmental stewardship and cultural preservation.

Farmers are increasingly adopting practices that recognise the importance of biodiversity, such as rotational grazing and conservation grazing, which have been shown to improve soil health and promote native vegetation. These practices are not merely beneficial for the environment but also align with the farmers' cultural identities, as many view their role as stewards of the land. As one farmer aptly noted, "If we lose our farms, we lose our stories, our culture, and our connection to the land." This sentiment demonstrates the urgency of supporting sustainable farming practices that benefit both production and the environment.

The challenges posed by climate change are prompting farmers to innovate and adapt. The commitment to breeding climate-resilient sheep and utilising carbon calculators reflects a proactive approach to addressing the impacts of extreme weather events. Farmers' willingness to implement changes within their systems demonstrates a growing recognition of their role in mitigating climate change while maintaining productivity.

The integration of sheep farming with public goods services, such as fire grazing, vineyard grazing, and solar panel grazing, showcases the multifunctional potential of upland sheep farming. These practices not only enhance ecological health but also provide economic benefits to farmers, illustrating a pathway toward sustainable agriculture that benefits both the environment and rural communities.

To personally contribute to this balance, I plan to diversify my production strategies within my business on the Great Orme by incorporating public goods services, particularly fire grazing, in the future. By leveraging support payments alongside traditional income from lamb sales and the additional revenue generated from fire grazing initiatives, I believe my farming business is well-positioned for a bright and sustainable future. This approach not only aims to enhance my agricultural productivity but also supports environmental stewardship, aligning with the broader goals of sustainable upland sheep farming.

In conclusion, the future of upland sheep farming hinges on the ability to find a balance that incorporates production efficiency, environmental conservation, and cultural identity. By embracing sustainable practices and fostering collaboration



between farmers, policymakers, and conservation organisations, the upland sheep farming sector can thrive while contributing to the resilience of both the landscape and the communities that depend on it. This research highlights the importance of continued dialogue and innovation in shaping the future of agriculture in the face of evolving challenges. Ultimately, the easiest way to achieve success in sheep farming in the uplands aligns closely with government recommendations for sustainable practices, reinforcing that ecological health and agricultural productivity can coexist harmoniously.



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