The Rufford Foundation
Final Report

Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Kencho Tshering
Project title	Assessing livestock management and its impact on conservation of threatened wild carnivores in western Bhutan
RSG reference	19731-1
Reporting period	May 2016 to May 2017
Amount of grant	£5000
Your email address	Kdring3@gmail.com
Date of this report	30/5/2017

1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Understand different types of current livestock management practices in Bhutan				The objective was fully achieved through the questionnaire survey and field surveys. We classified four general types of livestock herding practices from the responses to our questionnaire survey. (1) Stall feeding (SF) - raised in sheds and never taken to the nearby forest for grazing; (2) Free-range grazing with herder (FGH) - left freely grazing in the nearby SRF (State Reserve Forests) but accompanied by a herder; (3) Free-range grazing without herder (FGWH) - left freely grazing in the nearby SRF without a herder; and (4) Free-range pasture grazing (FPG) - left freely grazing in a fenced pasture land but without a herder.
Compare the vulnerability of livestock to wild predators among different livestock management practices				We determined that livestock generally released to the nearby forests for grazing (FGH and FGWH) were more vulnerable than those stall-fed (SF) and kept within some enclosures (FPG). The number of livestock lost to predators when not herded was significantly higher than when herded.
Study the impact of livestock management practices on wild predators				If livestock were properly herded within the forests with accompanying herders, predation losses were reduced irrespective of type, breed, and sex.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

I did not encounter any major unforeseen difficulties during the course of the project. All thanks to the relevant stakeholders and partner agencies for providing full support towards successful completion of the research project.

3. Briefly describe the three most important outcomes of your project.

1. Type of livestock management practices
I was able to determine four types of livestock management practices in the study area: 1) Stall feeding (SF)- animals were always raised in sheds where they were fed, and they were never left freely grazing in the forest; 2) Free grazing with herder(FGH)- animals freely grazed in the nearby state reserve forests, but accompanied by a herder; 3) Free grazing without herder(FGNH)- animals were left freely grazing in the nearby state reserve forests without accompanied by a herder; 4) Free tsamdro grazing (FTG)- animals were left freely grazing in a fenced pasture land without herder. Majority of the respondents (n = 193) practised FGNH of which 105 practised purely FGNH while 51 practised both SF and FGNH and 41 practiced both FGH and FGNH.

2. Relationship between livestock losses by breed and predator species
Local breeds of cattle were mostly lost to wild predators such as the tiger (P*anthera tigris*), leopard (*Panthera pardus*), dhole (C*uon alpinus*), and Asiatic bear (*Ursus thibetanus*) because they were the most dominant breed and less care was afforded to this breed. All predators did not even spare the Jerseys (imported high yielding breed) that were kept under intensive care. Among the equines, most of the horses and mules were lost to leopard, and none were lost to bears. Tigers predated mostly on jatsha and jatsham and local breeds that were found in deep jungles, which are the prime habitat for this largest predator.

3. Relationship between livestock losses by herding practice and predator species
While comparing the number of livestock lost to predators by livestock management practice, most of the livestock were lost when they were not herded (91.83%) as compared to when herded (8.17%). Indeed, the number of livestock lost to wild predators when not herded was significantly higher than when herded ($U=26617.5$, $Z=-9.92$, $p=0001$). This indicates that if most of livestock were herded; there would be significant reduction in the quantity of livestock to wild predators. This result underscores the fact that livestock herding is the most important aspect in minimising human-wildlife conflicts. Ecologically, the wild predators mostly preferred wild prey than the domestic prey. However, predation on domestic ungulates may remain high if livestock are locally abundant and are left without herders.

4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).

Some local people were hired as local guides and research assistants. Because they understood the magnitude of untended cattle in the forests, they were instrumental in creating awareness among the local communities about the need to herd their cattle in order to minimize losses to wild predators.

5. Are there any plans to continue this work?

Now that we have understood the core reasons why and how livestock are vulnerable to predation by wild predators, we would like to study the extent of grazing (or fodder) competition between livestock and wild ungulates.

6. How do you plan to share the results of your work with others?

I have submitted a manuscript to the international peer reviewed Journal of Pastoralism: Research, Policy and Practice, and it is now published. Data were collated from this and previous studies. It can be accessed from this link: https://pastoralismjournal.springeropen.com/articles/10.1186/s13570-017-0077-1. I have also shared it on Facebook and other official websites.

7. Timescale: Over what period was The Rufford Foundation grant used? How does this compare to the anticipated or actual length of the project?

The RSG was used from July to December 2016. Contrary to our initial proposal, we were able to complete the field surveys much in advance. This was possible because of the overwhelming support rendered by the community leaders and research assistants.

8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Printing of survey forms	£100	£100	£0	Adjusted to payment for printing reports
Field survey expenses (4 research assistants for 150 days @ £ 8 per day)	£4800	£4800	£0	Adjusted to payment for field survey
Printing of report	£100	£100	£0	Adjusted to payment for printing reports
TOTAL	**£5000**	**£5000**	**£0**	

9. Looking ahead, what do you feel are the important next steps?

Livestock in general were more vulnerable to predation when released into the forests without accompanying herders, especially during farming seasons. Cattle, particularly the indigenous breeds, were more vulnerable among different livestock

types. Proper livestock herding with accompanying livestock herders could minimize predation losses. We recommend development of a comprehensive livestock management policy that will ensure minimal livestock losses to wild predators. We think that there is an urgent need to study the extent of grazing competition between domestic cattle and wild ungulates. This will help in determining how much of the domestic cattle can be allowed to graze in the forests.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did The Rufford Foundation receive any publicity during the course of your work?

The Rufford Foundation logo was used while presenting at the research symposium at the College of Natural Resources, Bhutan. The participants were informed that I was one of the grants recipients from your esteemed foundation. The RSGF was also duly acknowledged in the journal paper which has recently been published.

11. Please provide a full list of all the members of your team and briefly what was their role in the project.

12. Any other comments?

Bhutan also faces the challenge of a typical biodiversity-rich country in having to juggle socioeconomic needs of farmers with ecological conservation. As I intend to submit another follow up project shortly I look forward to a similar support. It is my solemn request to the RSGF to continue supporting conservation research projects in Bhutan, which is a stronghold for conservation of many globally threatened taxa.