



UPPSALA
UNIVERSITET

Master thesis in Sustainable Development 2017/27
Examensarbete i Hållbar utveckling

Strengthening the Egg Value-Chain in Bhutan under the Philosophy of Gross National Happiness

Nivit Tanglertpaibul

DEPARTMENT OF
EARTH SCIENCES

INSTITUTIONEN FÖR
GEOVETENSKAPER

Master thesis in Sustainable Development 2017/27
Examensarbete i Hållbar utveckling

Strengthening the Egg Value-Chain in Bhutan
under the
Philosophy of Gross National Happiness

Nivit Tanglertpaibul

Supervisor: Harry Blokhuis
Evaluator: Stefan Gunnarsson

Content

1. Introduction	
1.1. Facts about Bhutan.....	1-2
1.2. Challenges in development.....	2
1.3. Aim.....	3
1.4. Importance of the study.....	3
2. Methods	
2.1. Unpublished data and personal communication.....	4
2.2. Literature study.....	4
2.3. Qualitative study.....	4
3. Background	
3.1. Gross National Happiness.....	5
3.1.1. Brief history and definition of Gross National Happiness.....	5
3.1.2. GNH survey results.....	5-6
3.2. A glance of livestock production in Bhutan.....	7-8
3.3. Food security.....	8
3.4. Egg production in Bhutan.....	8
3.5. Animal welfare.....	9-10
4. Results	11
4.1. Parent stock.....	12
4.2. Government nucleus farm.....	13-14
4.3. Egg producers.....	14-15
4.4. Egg dealers.....	15-16
4.5. Egg retailers.....	16-17
4.6. Consumers.....	17-18
4.7. Supporting stakeholders.....	19
4.7.1. Feed producers.....	19
4.7.2. Regional Livestock Development Centers.....	19
4.7.3. National Center for Animal Health.....	19
4.7.4. Department of Agriculture Marketing and Cooperative.....	19
4.8. Summary of the results.....	19-20
5. Discussion	21
5.1. Animal welfare - DOC transportation.....	22
5.2. Supply of layer DOCs.....	22
5.3. Male DOC utilization.....	23
5.4. Feed.....	23
5.5. Farm management and communication.....	24
5.6. Egg labeling and egg grading.....	24
5.7. Competitive egg market driven by the government.....	24-25
5.8. Egg price fluctuation.....	25
5.9. Consumer awareness and education.....	25
6. Conclusion	26
7. References	27-30
8. Appendix A-F	31-71

Tables

Table 1. Table for GNH score measurement.....	6
Table 2. December 2016, egg prices according to survey in Thimphu.....	16
Table 3. Summary of issues and challenges in Bhutan egg value-chain.....	19
Table 4. Summary of issues and challenges with potential solutions.....	21

Figures

Fig. 1. Bhutan meats produced in 2015.....	7
Fig. 2. Total number of eggs produced and sold in Bhutan Department of Livestock statistic 2011-2015.....	9
Fig. 3. Total number of local and improved poultry Department of Livestock statistic 2011-2015.....	9
Fig. 4. Key (orange boxes) and supporting (blue boxes) stakeholders in the egg value-chain.....	11
Fig. 5. Duration and transportation routes of PS DOCs from Indian suppliers.....	12
Fig. 6. Red stars are the 3 government nucleus farms that supply layers DOCs across Bhutan.....	13
Fig. 7. Bhutan's total numbers of layer farms in 2015.....	14

Pictures

Picture 1. Bhutan official is assisting in the DOCs inspection.....	12
Picture 2. Examples of a vehicle use for DOC transportation.....	14
Picture 3. Examples of a vehicle use for DOC transportation.....	14
Picture 4. Rock falling on the high way to Thimphu due to the heavy rain.....	16
Picture 5. Plastic packaging from chocolate is reused for eggs.....	17
Picture 6. A piece of a cardboard is used as a protection, but it is also make difficulty for consumers to check the quality of the eggs underneath.....	18
Picture 7. Customers buy a tray of egg that covered under a cardboard from YBC retailer.....	18

List of Abbreviation

BCOOP: Business Cooperative

CAPI: Computer-Assisted Personal Interviewing

CBS: Centre for Bhutan Studies

DAMC: Department of Agricultural Marketing and Cooperatives

DOC: Day Old Chicks

DoFPS: Department of Forests and Park Services

DoL: Department of Livestock

EAWP: European Animal Welfare Platform

EU: European Union

FAO: Food and Agriculture Organization of the United Nations

FYP: Five Years Plan

GDP: Gross Domestic Product

GNH: Gross National Happiness

GNHC: Gross National Happiness Commission

IHA: International Hydropower Association

IYCF: Young Child Feeding

JICA: Japan International Cooperation Agency

MDGs: Millennium Development Goals

MoAF: Ministry of Agriculture and Forestry

NCAH: National Center for Animal Health

Nu: Ngultrum (Bhutanese currency)

OIE: World Animal Health Organization

PS: Parent Stock

RGoB: Royal Government of Bhutan

RLDCs: Regional Livestock Development Centers

SDGs: Sustainable Development Goals

YBC: Youth Business Cooperative

Strengthening the Egg Value-Chain in Bhutan under the Philosophy of Gross National Happiness

NIVIT TANGLERTPAIBUL

Tanglertpaibul, N., 2017: Strengthening the egg value-chain in Bhutan under the philosophy of Gross National Happiness. *Master thesis in Sustainable Development at Uppsala University*, NO.2017/27, 71pp, 30 ECTS/hp

Abstract

Being a small landlocked country located in Eastern Himalaya ranges, makes it difficult for Bhutan to secure and sustain its national food security. Thus, Bhutan highly depends on the import of food from neighboring countries. This paper aims to improve the food security in Bhutan by giving a specific focus on the egg value-chain which starts from the import of parent stocks until the consumption within the country. Methods to identify potential constraints within the value-chain and provision of possible solutions used in this paper are a combination of literature reviews, qualitative studies (interview), and personal experience/communication of the author, who had been working with the Department of Livestock in Bhutan. The results of the study indicate that animal welfare, basic farm management, and consumer education are the top three areas that all stakeholders, especially government agents, should work with interdisciplinary in order to strengthen the overall value-chain. Challenges and room for improvement in animal welfare can be found from the beginning of the value-chain, the transporting of layer Day Old Chicks (DOCs). Lack of knowledge and skills for basic farm management which includes farm data recording, egg grading, and egg labeling, are issues found in the middle of the value-chain. Lastly, in the very end of the value-chain, more education should be given to consumers regarding the health benefits and nutritional value of eggs as to alleviate the problem of low egg consumption per capita relative to other developed nations. Possible solutions provided in this paper on animal welfare standard are suggested by the international projects and organizations namely, European Animal Welfare Platform and Food and Agriculture Organization of the United Nations. For basic farm management, the government should be the one who encourages and provides skills using effective communication tools as well as law enforcement in order to improve the egg quality. At the same time, consumers should be stimulated to demand higher quality as this will be a driving force for future improvement and create higher liquidity in the market.

Keywords: Sustainable Development, Egg production, Animal welfare, Gross National Happiness, Bhutan

Nivit Tanglertpaibul, *Department of Earth Sciences, Uppsala University, Villavägen 16, SE- 752 36 Uppsala, Sweden*

Strengthening the Egg Value-Chain in Bhutan under the Philosophy of Gross National Happiness

NIVIT TANGLERTPAIBUL

Tanglertpaibul, N., 2017: Strengthening the egg value-chain in Bhutan under the philosophy of Gross National Happiness. *Master thesis in Sustainable Development at Uppsala University*, NO.2017/27, 71pp, 30 ECTS/hp

Summary: Bhutan is a small landlocked country situated in Eastern part of Himalayan ranges which is surrounded by China and India. Bhutan is famous for its unique idea of happiness which easily misleads others to perceive that it is only a peaceful and a happy nation. However, in reality there are lots of challenges as well as opportunities and room for development in Bhutan, one of which is food security. By geography (being landlocked and covered with steep high mountains), Bhutan has a challenging task in both agriculture and livestock development. As a result, Bhutan relies heavily on the import of food from neighboring countries. Therefore, the aim of this paper is to find ways to improve the food security situation by giving a special focus on the egg value-chain since egg is a good and cheap source of protein that could, to some extent, strengthen food security in the country. Methods used in this paper are a combination of literature review, qualitative study (interview), and personal experience/communication of the author who has been working with the Department of Livestock. With these methodologies, the objectives are to identify constraints and challenges encountered by the country, and to provide possible solutions to improve the entire value-chain. It can be concluded that all stakeholders in the value-chain, especially the government, need to work interdisciplinary in order to improve the situation. The government agents should play a role in policy making and provide technical support using international standards. At the same time, consumers should also demand higher quality eggs and consume more eggs in order to trigger the market competition. Without the demand from consumers as a driving force, the pace of the development will not be dynamic enough to push forth improvement.

Keywords: Sustainable Development, Egg production, Animal welfare, Gross National Happiness, Bhutan

Nivit Tanglertpaibul, *Department of Earth Sciences, Uppsala University, Villavägen 16, SE- 752 36 Uppsala, Sweden*

1. Introduction

It is easily noticeable from the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) that the very first goals are in the area of food, hunger, and poverty. Although these issues have been discussed over decades, the problems and challenges still remain. When it comes to food and hunger alleviation, endless efforts have been made from the global levels to individual scale, and one of the activities suggested by the Food and Agriculture Organization (FAO) of the United Nations to improve the situation is small-scale poultry production. Family poultry production is the smallest livestock investment that village households in low income countries can easily practice (Sonaiya and Swan, 2004). Thus, it inspired the author of this report to be interested in the production of eggs and its value-chain in a small developing country, Bhutan.

1.1. Facts about Bhutan

Bhutan, a small hidden “Land of the Thunder Dragon” with a population of about 760,000 in the eastern Himalayan, sandwiched by the world first and second most populated countries, China and India. Geographically, the country’s total area is approximately 38,394 square kilometers with altitudes varying from 100 meter up to 7500 meter. This makes Bhutan a climatically unique country with three distinct ecological climatic zones, sub-tropical in the southern part, temperate in the center, and subalpine in the northern part (Wangchhuk, 2008). With this unique geography, Bhutan hosts more than 5,600 species of vascular plants, roughly 200 species of mammals, 586 species of butterfly (National Biodiversity Centre, 2014), and 770 species of resident and migratory birds (Allison, n.d). Considering the size of the country with enormous numbers of species, Bhutan is one the most significant biodiversity hotspot areas in Asia.

As a small landlocked country between China and India, Bhutan manages to distinguish its domestic tradition and is able to preserve its culture and unique way of future development. Happiness is one of the key performance indexes that the government uses to measure the success of the country rather than size of the economy; today this index is known as Gross National Happiness or GNH (more details will be provided in the background section). Regarding culture, religions in Bhutan consist of Buddhism (approximately 75%), Hinduism (approximately 22%), and Christianity (~3%). Most of the Buddhists densely populate the upper belt of the country. On the other hand, Hindu followers mostly reside in the southern part of the country (United States Department of State, 2015). Dzongkha is the national language that is mainly used in western Bhutan; however, it was recognized as a national language in 1971. Apart from Dzongkha, there are 3 more languages that are widely used in other parts of Bhutan, namely Bumthangkha in the Central part, Tshanglakha in the Eastern part and Nepali in the Southern part of the country (Wangchhuk, 2008). In addition, the Bhutanese also use and speak English on good conversational communication level because their schools are using English as a medium of instruction. Most of the government publications are also written in English. Besides language, “Gho” (for man) and “Kira” (for woman) are traditional costumes that civil servants and Bhutanese wear for all occasions, and it is compulsory to wear traditional dresses when Bhutanese enter the government house and official places (Wangchhuk, 2008).

Politically, Bhutan transformed the governance system from Monarchy into Democratic Constitutional Monarchy in 2008 and the first government election took place in the same year, 24 March 2008. Under this young constitution, at least 60% of the total area in Bhutan must be covered with forest, which makes Bhutan the only carbon negative country in the world (Royal government of Bhutan, 2012). With the support from the Bhutan royal family, the government and citizens, today 70.46% of the total land surface in Bhutan is covered with forest (Banerjee and Bandopadhyay, 2016).

Although Bhutan is a small country, Bhutan carries a strong potential of generating electricity with hydropower dams. Referring to “2016 Hydropower Status Report” by the International Hydropower Association or IHA, Bhutan has hydropower potential of 30,000 MW, of which 23,760 MW are considered to be economically feasible. Presently, the country’s total hydropower capacity is only 1,615 MW. This capacity is expected to increase since huge funds from the Indian government and private sectors are invested in the renewable energy sector in Bhutan. Hydropower projects in Bhutan

have contributed 27% of the government revenues and 14% of Bhutan's Gross Domestic Product or GDP (International Hydropower Association, 2016).

Another important source of income for Bhutan is tourism. In order to ensure that this sector is sustainable regarding culture, environment and people, the government established a policy called "high culture, low volume". Bhutan's government expects individual tourists who are visiting Bhutan to respect their culture, tradition, and environment. Thus, the government sets a daily minimum expenditure for individual tourists of \$250/day for the high tourist season and with this income schools and health care units in the country are funded (Schroeder, 2015).

Agriculture, livestock, forestry, industry, and services (tourism) sectors are the main contributors to Bhutan's GDP, \$2,058 million in 2015 (World Bank, 2017). Although the country's GDP is relatively small compared to other nations, the Bhutanese government is able to provide free health care and education to all its citizens. Though it seems that the Bhutanese can live simply with small farms and vegetable gardens surrounded with blue sky and mountains, there are many challenges in the country's development waiting ahead.

1.2. Challenges in development

As a small country hidden in the middle valley of Eastern Himalayas surrounded with snow top mountains, outsiders might foresee that Bhutan is a conservative and happy nation. However, in reality there are challenges within the country and room for future improvement that need to be developed in order to secure the happiness of the people, and one of the challenges that Bhutan has been confronted with is food security.

Annually, Bhutan has to import a lot of vegetables and most of processed and raw meat from India. The country has no legitimate slaughterhouse due to a strong believe in religion and lack of expertise in the field of livestock, especially meat processing (Dema, 2015). Therefore, food security is one of the critical problems Bhutan is facing. In late July 2016, due to climate change, the occurrence of flash flooding in Sarpang, the southern district of Bhutan, cut down important roads that provide access to the Indian border (UN Resident Coordinator for Bhutan, 2016). A few days later, many Bhutanese started to stock food for their family because there were no food supplies from India and food shortage was expected.

Not only food security is a major challenge for the Bhutanese, food safety is an issue as well. There are, for instance, no proper traceability systems for neither domestically produced nor imported meat. It is therefore difficult for consumers and government to trace back whether the animal is properly slaughtered at an Indian slaughterhouse or killed by some sort of accident or disease (Dema, 2015). Since official slaughterhouses are not socially accepted in the country, backyard slaughtering is secretly practiced in some areas. In most cases, backyard slaughtering is unhygienic and does not comply with animal welfare requirements (Tashi, 2009).

As the country's population keeps increasing, the demand for agricultural products is also on the rise. Unfortunately, the new generation with higher education are more likely to be very selective in jobs and most are interested in tourism business rather than agriculture and livestock sectors. According to the statistical data from the Ministry of Labour and Human Resources, youth unemployment (15-24 years) rate skyrocketed in 2015 to 10.7%. In the period 2010-2015 rates have never decreased. The percentage in 2015 consisted of both unemployment rates from urban (28%) and rural areas (4.8%) (Labour Market Information, 2015). Youth unemployment is not only an economic issue, but it can potentially lead to social problems as well. Thus, it is important to provide decent jobs and employment opportunities to maintain harmony within the society (United Nations Development Programme, 2013).

Since food security is a major problem and agriculture and livestock productions are neglected by youngsters, the government is pursuing a long-term development starting from the smallest livestock investment activity that could be implemented by small household units, as aforementioned, egg production.

1.3. Aim

The objectives of this study is to understand the current situation of livestock development in Bhutan by giving special attention to the egg value-chain as egg is a good and cheap source of protein that could, to some extent, strengthen food security and partially involve in sustainable development in the country. Besides understanding the value-chain, the second aim is to learn how the value-chain can be improved by adopting best practices from developed countries and international standards. However, such best practices should coincide with the concept of Gross National Happiness as it is the core value of Bhutan.

The following are specific objectives and aims of the study

- To suggest practical solutions to improve the situation in the egg value-chain.
- To see potentials in articulating positive impacts from egg value-chain into other aspects related to sustainable development.

1.4. Importance of the study

The study can contribute to three areas. First, it can have a direct positive impact on the well-being of the Bhutanese. If the egg value-chain is strengthened and well-organized, it can become a good source of protein and contribute to secure nutritious food availability in the country. With a stronger domestic egg production sector, the country will have more control and might be able to implement a traceability system, which could lead to improved health risk management and increased food safety. The second contribution is in the area of job creation. As egg production requires low investment compared to other livestock activities, it is possible that people in rural areas and youngsters might be interested in the business. The last area that this study could contribute to is future livestock development in general for developing countries. The result of this study might provide a better understanding of livestock production, especially egg production, for other low income countries to be inspired and to improve situations.

1.5. Limitation of the study

The study was conducted within limited amount of time and the scope of the study is only focusing on small sample group of stakeholders, mainly in Thimphu. Therefore, the results of this study cannot be generalized and draw final conclusion to the situation of the egg value-chain in Bhutan. However, the results of this study could provide an overview picture of the egg value-chain and might reveal some key areas that are needed to be improved in the future.

2. Methods

In this study, the combination of personal communication, literature, and qualitative oriented approaches were used to investigate the egg value-chain and provided suggestions that aim to strengthen the egg value-chain and other aspects of sustainable development.

2.1. Unpublished data and personal communication

The author of this paper has been working with Bhutan's Department of Livestock for 5 months as an intern student. During that time, the author gained access to unpublished data from the Department and Bhutanese officials which are used in this paper. Although these data are not always completely verified by the government and published, the information was considered essentially sufficient and reliable to portray the upcoming trend and provide ideas on the situation of the egg value-chain in Bhutan. In addition, this information can be traced back to its origin as all the records are well preserved by the author.

2.2. Literature study

The literature study aimed to provide a better understanding and overview of how the egg value-chain as well as the general food situation in Bhutan looks like. Government publications, newspaper articles, journals, and scientific papers related to the egg value-chain and food security in Bhutan were used to provide basic information for the study. Once the issues and problems were identified from the literature, the following step was to find good examples of possible practical solutions for further discussions with stakeholders and formulation of recommendations. Since Sweden has one of the most stringent animal welfare legislations in the world (the first country to prohibit the use of conventional battery cages for laying hens (Jansson, 2016)), and is technologically advanced in poultry production, Swedish publications, studies, and examples related to poultry production were prioritized and used as reference where possible.

2.3. Qualitative study

To provide further insight regarding the egg value-chain and to complement information and conclusions, a qualitative study was carried out. Both face-to-face (Appendix E and F) and telephone interviews (Appendix C and D) were qualitative methods adopted in this research. Key stakeholders along the egg value-chain were identified and interviewed in Dzongkha (Bhutan's national language) by a Bhutanese official in the Department of Livestock, to reduce the risk of miscommunication. In addition, face-to-face interviews were mainly conducted with egg retailers and consumers in Thimphu, as it is the capital and major hub of the country. Egg producers from different areas in the country were interviewed by telephone in order to save time and transportation costs. Later, all the interview results were reviewed and translated into English with the support from the Department of Livestock before used in this study.

Finally, results from all of the studies were combined and discussed in the discussion section, where best practices and suggestions from poultry experts were used to find potential recommendations to the value-chain.

3. Background

3.1. Gross National Happiness

3.1.1. Brief history and definition of Gross National Happiness

In 1972, His Majesty Jigme Sinye Wangchuck, The Great Fourth Druk Gyalpo mentioned that “*Gross National Happiness is more important than Gross National Product*”. He believes that Gross Domestic Product alone cannot deliver happiness and well-being to the people because it is only a tool that measures an external human condition related to materialistic values (Asian Development Bank, 2015). Therefore, GDP has limitations that can be summarized as follows. Firstly, it is difficult to make a distinction between GDP generated from good and bad developments. Secondly, the value of nature, human, and social capital are not adequately measured by using GDP. Thirdly, GDP does not value amount of free time. Fourth, unpaid work is not valued. Fifth, it does not clearly provide equality (Asian Development Bank, 2015). Because of these reasons, Bhutan initiated a measurement tool to measure the progress of the country instead of GDP.

This newly established measurement tool is called Gross National Happiness or GNH. By definition and concept, GNH is a tool that provides a holistic and sustainable approach to developments, and which balances between materialistic and non-materialistic values with the conviction that humans want to search for happiness (GNH Centre Bhutan, 2017). Presently, GNH is implemented into government policies, management systems, and gradually becoming accepted by Bhutanese throughout the country. Moreover, with the support from the Bhutan Royal Family and the government, GNH is also stated in the Bhutan constitution. According to the Constitution of Bhutan Article 9, “*The state shall strive to promote those conditions that will enable to pursuit of GNH*”.

Over time, GNH has developed, and today GNH consists of 4 pillars with 9 domains, 72 indicators, and 151 variables that aim to measure and create happiness to all Bhutanese people (GNH Centre Bhutan, 2017). The 4 pillars of GNH consist of i) Sustainable and equitable socioeconomic development, ii) Preservation and promotion of culture, iii) Environmental conservation, and iv) Good governance. The key concepts of each pillar are highly related to a concept of sustainable development. From the 4 pillars 9 domains are elaborated, which are i) Living Standards, ii) Education, iii) Health, iv) Environment, v) Community Vitality, vi) Time-Use, vii) Psychological well-being, viii) Good governance, and ix) Cultural resilience and promotion (GNH Centre Bhutan, 2017). Finally, all of the aforementioned GNH components provide frameworks for the government to measure the well-being of Bhutanese people and assist them in initiating ideas for more effective governance.

3.1.2. GNH survey results

The first official GNH survey was reported by the Centre for Bhutan Studies (CBS) in 2010 and the most recent GNH survey was in 2015. For the year 2015, the survey was financially supported by the Royal Government of Bhutan (RGoB) and Japan International Cooperation Agency (JICA). Basically, the GNH survey is a qualitative study with a set of questions that relate to the 9 domains of GNH (Centre for Bhutan Studies & GNH Research, 2016).

Since GNH is a new measurement tool, presently there are only two reports available for study. Thus, CBS and GNH researchers are only able to compare the two results and understand changes from 2010 to 2015. For the GNH surveys, respectively 8,510 and 8,871 Bhutanese people were sampled and involved in the studies. Methods used for the surveys were face to face interviews that were guided by paper-based questionnaires as well as Computer-Assisted Personal Interviewing (CAPI). According to the 2015 GNH Survey Report, the GNH index in 2015 has increased approximately 1.7% from 2010. In other words, Bhutanese were 1.7% happier compared to 2010. Furthermore, to measure GNH, the table below provides a guideline on how the GNH score is calculated for each individual (Table 1). Beside the GNH index, findings from this survey found that Bhutanese who live in urban areas are happier than those who live in rural areas due to better living conditions and education (Centre for Bhutan Studies & GNH Research, 2016). Although the happiness index has

increased, the people’s impression of the government’s performance has declined because there are still issues with jobs creation, income inequality, and corruption. Moreover, the survey also indicated that Bhutanese’s perception in terms of the sense of trust to their neighbors had reduced, from 85.3% to 61.6% as well as the sense of belonging to the local community, which declined from 72.5% to 65.8%. Apart from the sense of trust and belonging, the number of people who have an attitude of being ‘highly responsible’ for conserving and preserving the natural environment has also declined by 3.7%, from 82.4% to 78.7% between 2010 and 2015 (Centre for Bhutan Studies & GNH Research, 2016).

The above examples of the results from the GNH Survey Report reflect the overall perception of the people. There could be biases in the results since the report is based on perceptions from a relatively small sample size. However, this information is considered beneficial for the government to consider and make adjustments in their policies and development plans.

Table 1. Table for GNH score measurement.

Domain	Indicators	Indicators Weight
Psychological wellbeing	<ul style="list-style-type: none"> • Life satisfaction • Positive emotion • Negative emotion • Spirituality 	<ul style="list-style-type: none"> • 1/3 • 1/6 • 1/6 • 1/3
Health	<ul style="list-style-type: none"> • Self-reported health status • Number of healthy days • Disability • Mental health 	<ul style="list-style-type: none"> • 1/10 • 3/10 • 3/10 • 3/10
Time use	<ul style="list-style-type: none"> • Work • Sleep 	<ul style="list-style-type: none"> • 1/2 • 1/2
Education	<ul style="list-style-type: none"> • Literacy • Schooling • Knowledge • Value 	<ul style="list-style-type: none"> • 3/10 • 3/10 • 1/5 • 1/5
Cultural diversity & Resilience	<ul style="list-style-type: none"> • Artisan skills • Cultural participation • Speak native language • Code of conduct 	<ul style="list-style-type: none"> • 3/10 • 3/10 • 1/5 • 1/5
Good governance	<ul style="list-style-type: none"> • Political participation • Services • Governance performance • Fundamental rights 	<ul style="list-style-type: none"> • 2/5 • 2/5 • 1/10 • 1/10
Community vitality	<ul style="list-style-type: none"> • Donation (Time and Money) • Safety • Community relationship • Family 	<ul style="list-style-type: none"> • 3/10 • 3/10 • 1/5 • 1/5
Ecological diversity & resilience	<ul style="list-style-type: none"> • Wildlife damage • Urban issues • Responsibility to environment • Ecological issues 	<ul style="list-style-type: none"> • 2/5 • 2/5 • 1/10 • 1/10
Living Standard	<ul style="list-style-type: none"> • Income • Assets • Housing 	<ul style="list-style-type: none"> • 1/3 • 1/3 • 1/3

3.2. A glance of livestock production in Bhutan

The Ministry of Agriculture and Forestry (MoAF) of Bhutan is located in the capital, Thimphu. There are 4 departments working under MoAF, which are the Department of Agriculture (DoA), the Department of Livestock (DoL), the Department of Forests and Park Services (DoFPS), and the Department of Agricultural Marketing and Cooperatives (DAMC) (Ministry of Agricultural and Forests, 2017). The majority of livestock production in the country is taking control by DoL. Thus, DoL is responsible for livestock development in the country.

DoL’s vision and mission is “to attain food security and self-sufficiency in livestock products through enhanced rural livelihoods to alleviate poverty” as well as “to increase livestock productivity by ensuring prompt delivery of appropriate technologies and services through commodity based approach” (Ministry of Agricultural and Forests, 2017). To reach this visionary, 4 divisions, which are Livestock Production & Marketing, Livestock Research & Extension, Animal Health, and Animal Nutrition divisions, under DoL are working and collaborating to improve livestock activities and the general situation in Bhutan.

According to the National Statistics Bureau of the Royal Government of Bhutan, in 2015 the primary sector (Agriculture, Livestock and Forestry) had contributed over Nu. (Ngultrum: Bhutanese currency) 22,007.59 million or 16.67% of the total GDP in 2015. Besides, the primary sector, secondary (Industry) and tertiary (Services) sectors had contributed Nu. 54,573.85 million or 41.34% and Nu. 55,439.86 million or 41.99% of the total 2015’s GDP respectively (National Statistics Bureau, 2016).

Although Bhutan is considered an agriculture-based society where nearly 60% of the people are depending on agriculture and livestock activities, Bhutan is not yet self-sufficient in terms of food and still relies heavily on food imports (RNR Sector, 2012). In 2015, Bhutan produced approximately 2,563,454 kg of meats (Figure 1); however, it was still not enough to serve the demand. Thus, Bhutan imported additional animal products from mainly India and other countries to an amount of approximately Nu. 2.847 billion in the year 2015 (Department of Revenue & Customs, 2016).

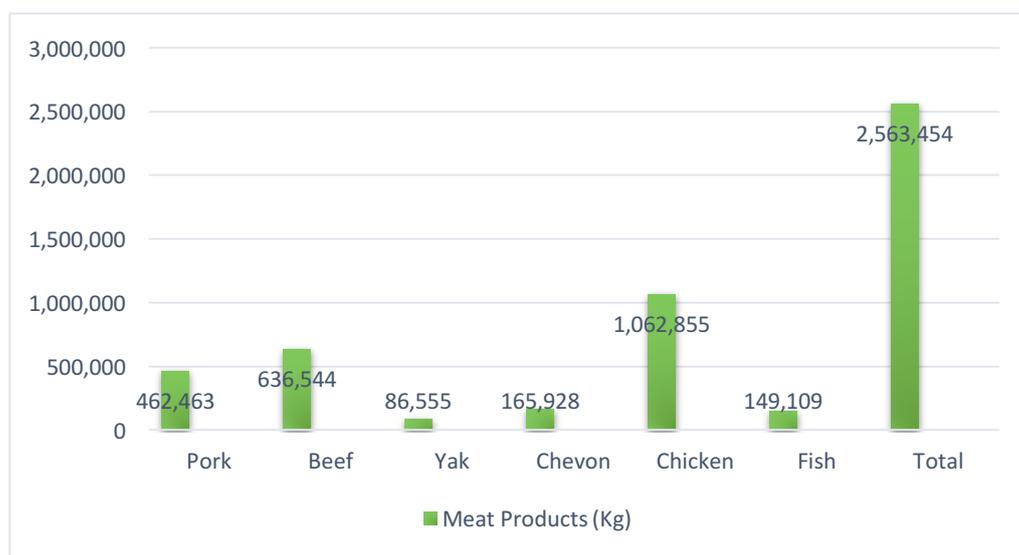


Fig. 1. Bhutan meats produced in 2015.

The import of animal products creates a high cost burden and slows down the country’s economy. Now the government, MoAF, is working its way to promote food sufficiency programs and livestock productivity within the country (RNR Sector, 2012). MoAF has prioritized this agenda and incorporated it into the Five Years Plan (FYP), 5 years national plans for development which collaborate with the National Planning Guideline from the Gross National Happiness Commission (GNHC) (RNR Sector, 2012). The current FYP is the 11th edition, which represents the years 2013-2018. According to the 11th FYP, the agriculture and livestock production situation in the country has

been improved. However, food issues still remain and challenges are in the areas of food security, poverty, agricultural land transformation, as well as resources, market and usage efficiency (RNR Sector, 2012).

3.3. Food security

Food security can be defined in various ways. In 1996 the Food and Agriculture Organization of the United Nations (FAO) defined food security as “*the access for all people at all times to enough food for health, active life*”. One of the key messages from the definition is “*all people*”, which explicitly emphasize that the poor must also gain access to sufficient food supply (PPD and MoAF, 2010). At the same time, the word “*access*” can be ramified into two dimensions. First, accessibility to food can be done through purchasing, and the other is through self-production (PPD and MoAF, 2010).

Food insecurity is not a new issue for Bhutan. The problem was identified and discussed since 1981. From time to time over 30 years, food security policies have been developed as well as the situation in the country. Recently, food availability is much more stable through increased production capacity and importation. Today many Bhutanese enjoy wide varieties of food. However, the nutritional aspect has been neglected (RNR Sector, 2012). According to National Nutrition and Infant and Young Child Feeding (IYCF) survey in 2008, 34.9% of Bhutanese children under 5 years old are stunted (too short), 10.4% are underweight (too small), and 4.7% are wasted (too thin) (Zangmo et al, 2012). On average, Bhutan spends over 2.4 million USD annually on solving the vitamins and mineral deficiencies issue (World Bank, 2009).

Referring to the current 11th FYP, the poor in Bhutan are still struggling to gain access to food supply, interestingly, not because of food unavailability, but because of their lack of purchasing power (RNR Sector, 2012). To minimize the problem, the government is trying to improve the situation by promoting poverty alleviation programs through livestock activities. However, the encouragement is not so successful because there are religious taboos and socio-cultural sensitivities towards slaughtering of animals for food (Tashi, 2009). Thus, since domestic production of meat is sensitive in Bhutan, the alternative is to promote egg production not only for the sake of poverty alleviation, but also to push forward the concern of nutritional value i.e. source of protein.

3.4. Egg production in Bhutan

By the end of 9th FYP (2002-2007), poultry farming in Bhutan was operated as small backyard type. During that time, the majority of eggs was imported from India to serve the demand in the country. The highest import of eggs was in 2010 at approximately 10 million eggs (Wangchuk, 2016). The avian flu outbreak in neighboring countries, especially in India, then triggered the government to review its policy on imports of animal products and all imports of poultry products (including eggs) were banned due to the outbreak (RNR Newspaper, 2013). The government then established a self-sufficiency food policy to shield the food security in the country. Food self-sufficiency is the ability of an individual, household or nation, to meet its own food demand from its own production. In general, this terminology refers to staple food crops, like cereals and root crops (PPD and MoAF, 2010). However, the production of eggs is also included in this context.

From the 10th FYP (2008-2013) onward, the domestic egg production has increased and finally met the country’s demand in 2012, meaning that Bhutan is no longer in need to outsource for eggs supply (Wangchuk, 2016). However, the egg consumption per capita is low, 90 eggs per person per year (Wangdi, 2015). The graph below (Figure 2) shows the total number of eggs produced and sold in Bhutan. There is a clear relation with the increasing total number of improved genetic/breed of layer poultry (Figure 3). Improved layer breeds are exotic and belong in a group of Hyline Brown and Hyline Silver Brown (For more details on breeds, please see Appendix A and B).

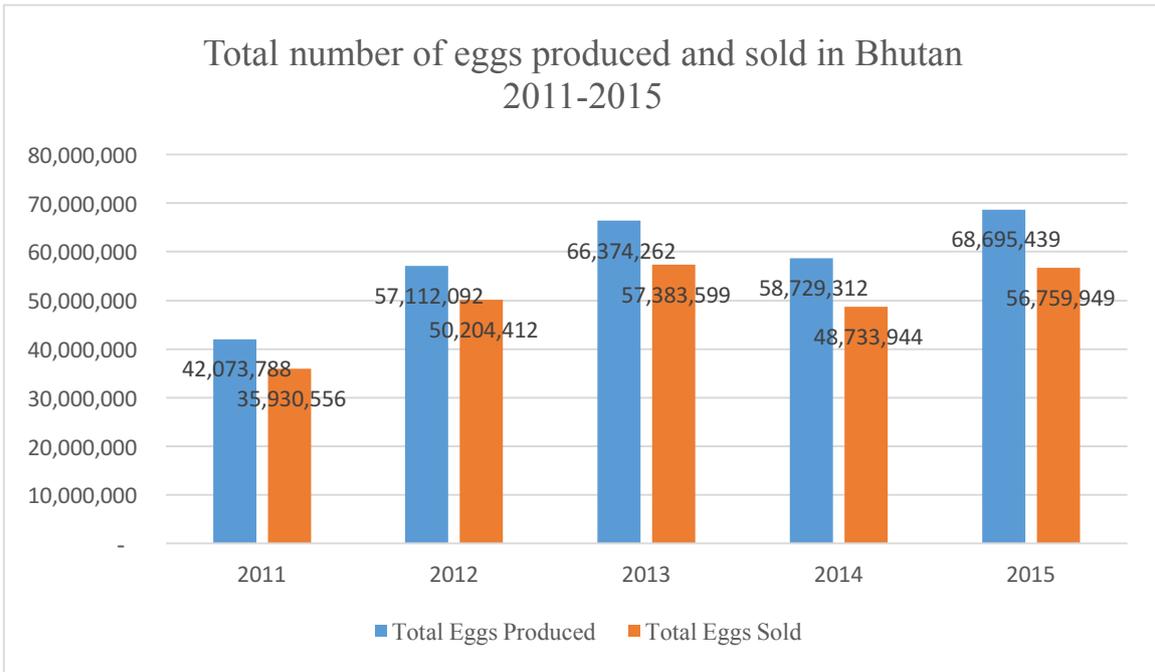


Fig. 2. Total number of eggs produced and sold in Bhutan Department of Livestock statistic 2011-2015.

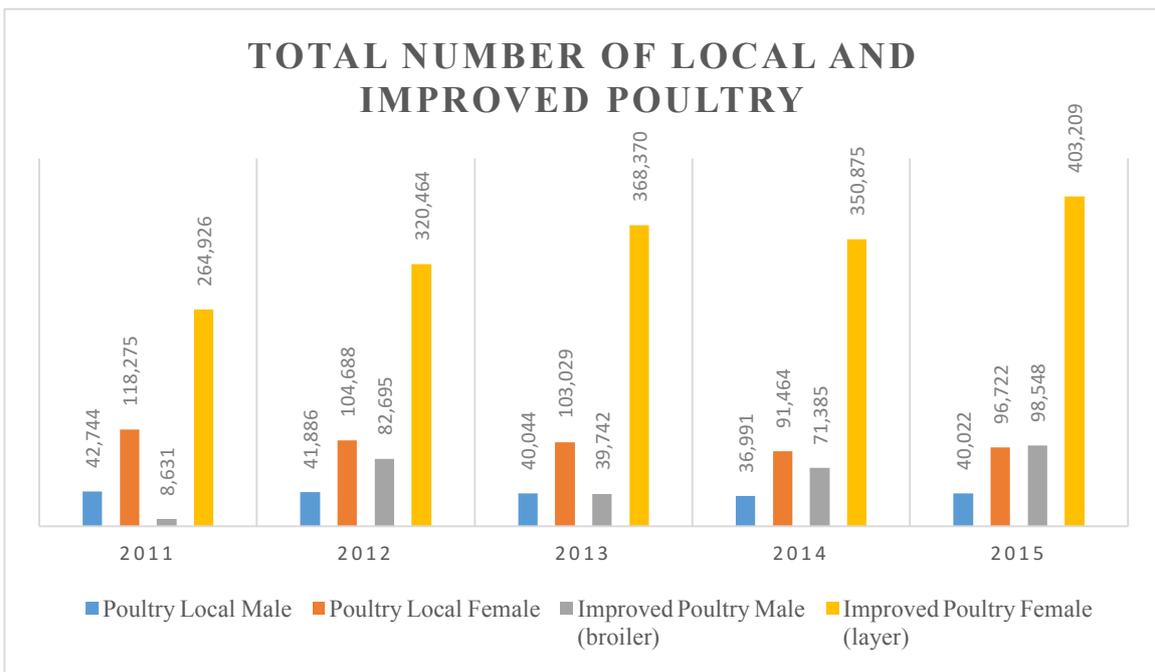


Fig. 3. Total number of local and improved poultry Department of Livestock statistic 2011-2015.

3.5. Animal welfare

Generally, people could have different perceptions and values toward welfare of animals. Some people may view it as the basic health and functioning of animals where animals are free from disease and injury. While some understand it as the ability for animals to live and express natural behavior. Different perceptions and set of values are represented in debates and thus a group led by European scientists are trying to use science as a tool to create a framework and guidelines for these values (Fraser, 2008). Not only the scientists, NGOs, international agencies, and government bodies are also

trying to give definitions and guidelines toward animal welfare. For example, the World Animal Health Organization or OIE, defines that animal welfare means “*how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if it is not suffering from unpleasant states such as pain, fear, and distress*”.

Another dimension of the animal welfare discussion that is worth mentioning is related to livestock business and international trade. As the cost of animal production in low income countries is lower than in high income countries, it is an opportunity for low income countries to export animal products at global level. However, low income countries that want to export animal products to EU markets must then show good practice in relation to animal welfare (Van Horne et al, 2008). In high income countries especially Europe, the society and markets are highly concerned about animal welfare, and they strongly require specific welfare standards from producers. At the same time, government bodies like the European Union Commission is also demanding defined conditions at slaughterhouses from non EU countries.

Animal welfare in the poultry industry can be classified into two groups, meats and eggs. The welfare requirements for broilers (meat) consist of good ventilation, suitable density of birds, sufficient food and water, and well management on sanitation and good health (Van Horne et al, 2008). The second group in poultry industry is layers (eggs). Like broilers, a good housing system should provide comfort and welfare for animals. In the past, the majority of housing systems for commercial layers were barren housing systems, known as battery cage. Battery cage housing provides poor welfare for the animals as the animals are living in a very limited space and cannot express their innate behavior. Thus, for the last 50 years, housing systems have been debated and developed over time. European countries led by Sweden, Norway, and Switzerland have put a lot of effort in improving housing systems that provide better welfare for the animals. Finally, in 2012, battery cage housing systems were banned throughout the European Union. Today, farmers have alternative housing systems to choose for their egg production. The first alternative is the barn system, which is a poultry house that allows layers to move around and express their innate behavior under one big roof. Second alternative is the free range system, this allow layers to additionally access an outdoor run. Third alternative is enriched housing which also known as furnished cages. This type of housing is equipped with similar equipment used in conventional laying cages; however, it provides additional equipment (more space, lighting, and etc.) that allow layers to express their innate behavior. Although these alternative housing systems offer higher welfare to animals, some experts argue that the battery cage system is the most economic way to produce eggs and it is the best option for disease prevention (Van Horne et al, 2008).

In addition, there is a positive correlation between good animal welfare practices and productivity. For example, if the animals are well managed, fulfilling animal welfare requirements, it is more likely that the production of meat or eggs will be good. Furthermore, for example in France, many people are having perceptions that eggs produced from “happy” chickens, meaning well taken care off by farmers and complying with higher animal welfare regulations, are tastier and authentic (Evans and Miele 2007; Kjørstad 2005).

For Bhutan in 2012 the MoAF and Royal Bhutan Government declared that “*any female domesticated chicken, turkey, duck, goose, or guinea fowl kept for the purpose of egg production, including pullets, shall never be continually confined in restrictive cages that prevent them from fully stretching their limbs or expressing important natural behaviors*”. Since then the majority of egg producers implemented barn-housing systems instead of battery cages (Humane Society International, 2012). Last but not least, animal welfare is not only about right housing systems, but also transportation, farm management, and slaughtering should be in the focus as well.

4. Results

In order to understand the most current situation on the egg value-chain in Bhutan, personal communication with Department of Livestock and a qualitative study using an interview approach that involved 30 respondents (5 egg producers, 2 egg dealers, 11 egg retailers, and 12 consumers) from the egg value-chain, was conducted in December 2016 at the capital of Bhutan, Thimphu. One of the poultry officials who works with DoL, was assigned by the department to support and coordinate with all the respondents for this study. Therefore, Dzongkha, the Bhutanese local language, is used to avoid misunderstanding in communication. The results from the interviews were then translated into English with support from the department. Additional data, statistics, technical numbers and unpublished information, mentioned in below sections were also provided by the department directly.

6 key stakeholders (orange boxes) and 5 supporting stakeholders (blue boxes) were identified for the study (Figure 4). The identification of key and supporting stakeholders makes it easier to see and understand the whole picture of the egg value-chain.

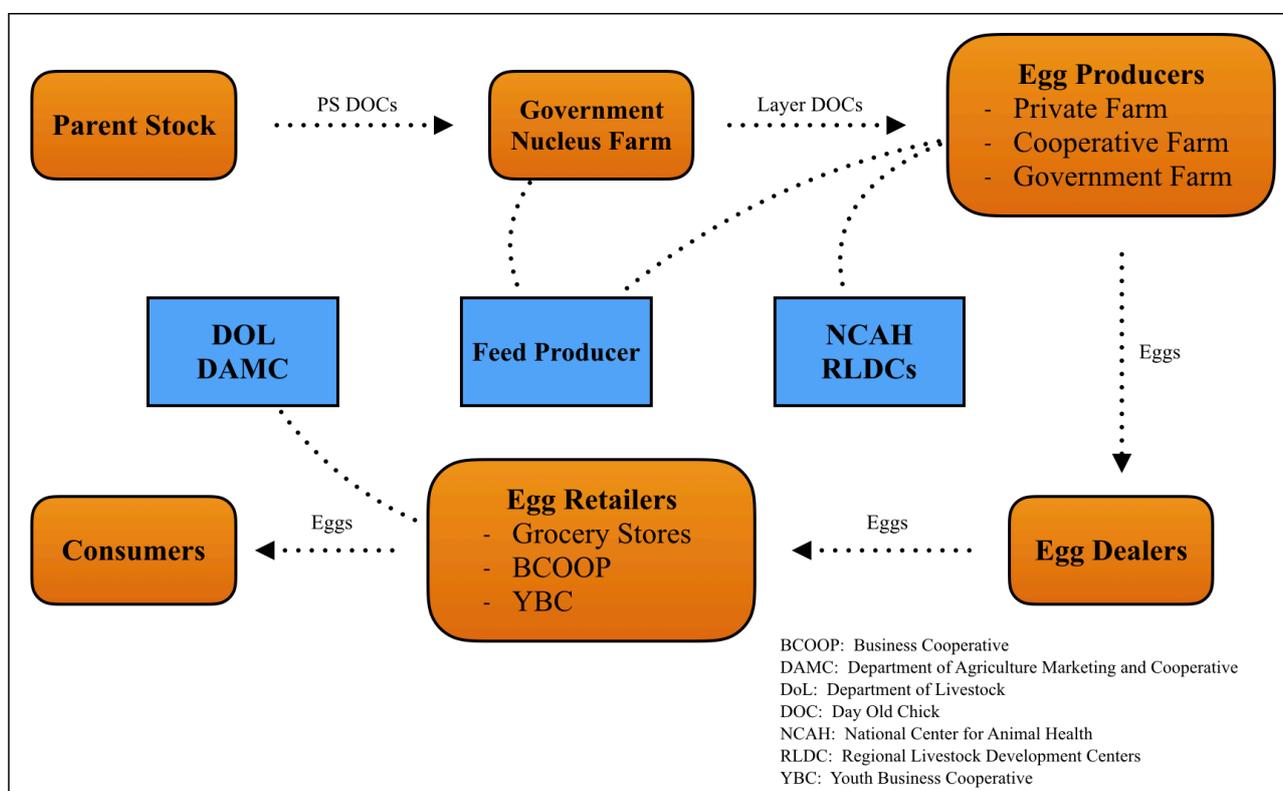


Fig. 4. Key (orange boxes) and supporting (blue boxes) stakeholders in the egg value-chain.

4.1. Parent stock

Parent Stock (PS) is imported as Day Old Chick (DOC) from India; selective breeds for the DOCs are “Hy-line Brown” and “Hy-line Silver Brown” (Appendix A and B). In 2016, the government imported about 16,000 PS DOCs for egg production from Indian companies (Statistic from the Department of Livestock – Unpublished data). These imported DOCs were then distributed to 3 government nucleus farms, which are located in Sarpang district (South), Mongar district (East), and Paro district (West). Since the climatic condition in Sarpang is most suitable (warm climate) for livestock production, over 50% of the DOCs were allocated to the Southern part of the country. Although Bhutan and India are neighboring countries, the DOC delivery times from Indian suppliers to government nucleus farms can vary from 27.9 hours up to 51.6 hours due to distance and poor road conditions in Bhutan. Thus, the longer the transportation time for delivery of the DOCs, the higher the mortality rate of the DOCs is. Transportation routes of the DOCs are explained in Figure 5. At the moment, the mortality rate, on average, is approximately 5% per one consignment, and this generates an unnecessary cost burden for the government (Commercial invoices from National Poultry Breeding Centre – Unpublished data).

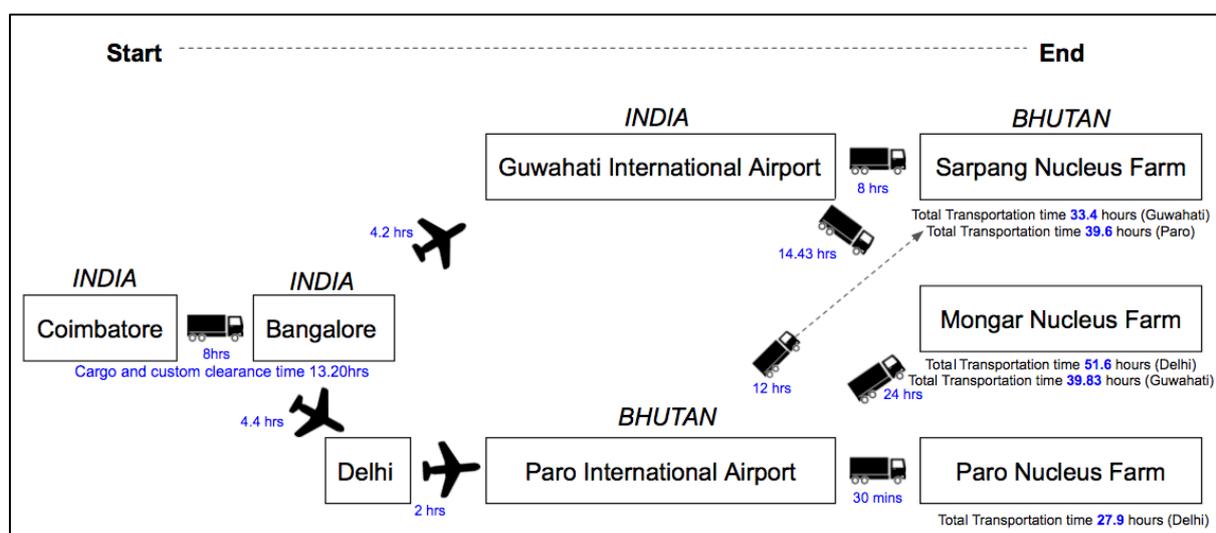


Fig. 5. Duration and transportation routes of PS DOCs from Indian suppliers.



Picture 1. Bhutan official is assisting in the DOCs inspection.

4.2. Government nucleus farm

The three government nucleus farms are strategically located to supply layer DOCs to local farmers across Bhutan. Paro nucleus farm is located in the Western region and supplies layer DOCs to Haa, Thimphu, Gasa, Punakha, Wangdue, and Chukha districts. Similarly, Mongar nucleus farm, which is located in the Eastern region provides layer DOCs to Lhuntse, Trashigang, Trashiyangtse, Bumthang, Pemagatshel and Samdrup Jongkhar districts. The remaining districts in the Southern region, Tsirang, Daga, Zhemgang, Trongsa and Samtse, are then supplied by Sarpang nucleus farm (Figure 6).



Fig. 6. Red stars are the 3 government nucleus farms that supply layers DOCs across Bhutan.

As food self-sufficiency is one of the most important policies that the government is promoting, the government subsidizes the price of layer DOCs by 50% in order to promote egg production within the country. Because of the promotion, many farmers are interested in farming egg layers and the government nucleus farms have to maximize their productivity in supplying layer DOCs to farmers. However, the layers DOCs are not sufficient and well distributed due to the high and fluctuating demands. As a result, after requesting DOC to government nucleus farms, many farmers have to wait for the delivery of layer DOCs from 2 weeks up to 5 months (Appendix C). Consequently, some farmers quit and have to stop their businesses. Apart from the inability to fulfill the demand of layer DOCs, vehicles used for DOCs transportation are not properly designed; therefore, there is also a high mortality rate caused by transportation (Picture 2 and 3).



Picture 2.



Picture 3.

Picture 2. and 3. Examples of a vehicle use for DOC transportation.

Not only losses during transportation are a drawback of a deficient delivery system, animal welfare is also at risk. In relation to animal welfare it can also be mentioned that, like many in other layer nucleus farms, male DOCs are disposed as they cannot lay eggs and are not suitable for chicken meat consumption. The disposition technique Bhutan currently employs is through the use of gas chamber. However, a minor group of male DOCs would be passed on, at no cost, to some farmers who intend to continue raising those chickens.

4.3. Egg producers

According to the Department of Livestock statistics in 2015, the total number of layer farms in Bhutan was 774 farms (Wangchuk, 2016). Out of the total number, 419 are micro farms (50-100 birds), 233 are semi-commercial farms (101-500 birds), 118 are commercial farms (510-5000 birds), and 4 are mega farms (more than 5,001 birds) (Figure 7).

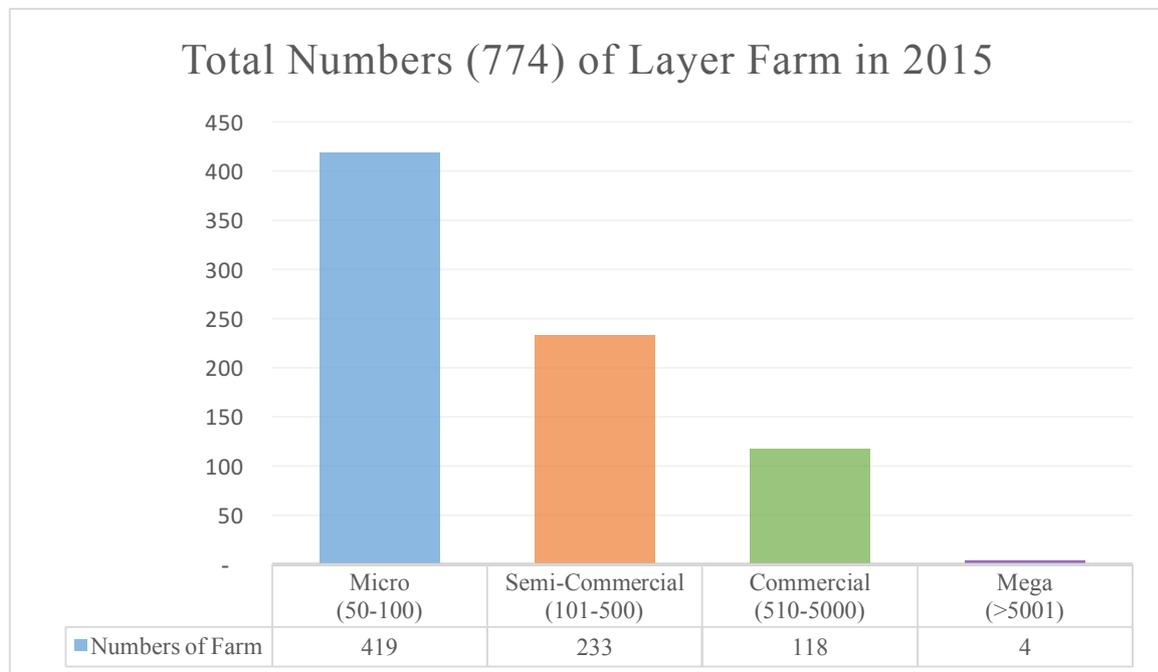


Fig. 7. Bhutan's total numbers of layer farms in 2015.

From 5 telephone interviews with egg producers in Bhutan, it appeared that one of the major challenges at the moment is the increasing production cost, and the main contributor to this increase is the feed price (Appendix C). More information regarding feed issues in Bhutan will be mentioned in

the Feed Producer section. The second challenge for egg producers is the fluctuation in market price of eggs. Egg price varies in response to the market force i.e. price goes up when demand exceeds supply and vice versa. As the government nucleus farms cannot provide layer DOCs up to demand, it is difficult for farmers to accurately plan their production capability and this contributes to be a cause of price fluctuation. Moreover, all of the respondents from the interviews wished to have a national uniform price of eggs announced by the government in order to secure their businesses from unpredictable price risk (Appendix C). Beside expensive feed and egg price fluctuation, another challenge is inadequate skills and knowledge to manage the farm efficiently. Some egg producers neglect to conduct a systematic record of their farming activities and output. From the interviews, the reasons provided by the respondents are “*they do not know how to write*” or “*they have no education and cannot do the recording*” (Appendix C). Since basic farming data recording is not properly done, egg grades classification is also absent. The majority of eggs produced in Bhutan were not categorized properly in accordance to quality and size; moreover, basic information labeling like production and expiry dates is also not presented on those eggs. As the domestic egg production is still highly unstable, the government attempted to increase egg production by initiating Bhutan Livestock Development Corporation limited with 16,000 birds which can produce approximately 12,180 eggs per day (Wangchuk, 2016).

Regarding animal welfare, spent layers are not properly managed since there is no legitimate slaughterhouse in the country. According to the interview, one of the egg producers sold alive spent layers directly to Indian laborers who work at construction sites. Thus, it can be assumed that the spent layers will be slaughtered in an unprofessional manner.

4.4. Egg dealers

Based on the information from the 2 telephone interviews (Appendix D), on average 80-105 cartons of egg are sold weekly per one egg dealer. Egg dealers make profits by buying eggs at farm gate price, which ranges between Nu.1300 to Nu.1323 per carton, and resell them with a margin at a rate ranging from Nu. 1400 to Nu. 1500. Most of the time, egg dealers resell their eggs directly to retailers or grocery stores. However, when they are unable to sell out all their egg inventories, they then simply resell eggs by door to door sales service, meaning that the dealers will conduct a direct sale to individual end users house by house (Appendix D).

As there are no labeled details, production and expiry dates on eggs, some egg dealers receive complaints from their customers for the low quality of their eggs. However, the poor quality is not solely caused by defective farm management (lack of labeling), it is also because of the delay in egg delivery by dealers. Roads in Bhutan are on average in a relatively poor condition, thus it could take 4 to 10 days for the dealers to deliver and resell eggs in the market (Appendix D). One of the dealers mentioned that there used to be a roadblock during summer in which the temperature is significantly higher, and eggs are easily spoiled. Bumpy and bad road conditions also place higher cost burden to egg business because egg cracks and loss during transportation are an unavoidable risk. (Picture 4).

Apart from egg spoilage, another egg dealer opened up during the interview and mentioned that presently there are excessive numbers of egg dealers and egg supply in the market; consequently, intense market competition makes it hard to resell eggs. However, the situation can be even worse as the government also own egg farms and sell eggs into the market. As a result, egg dealers have to compete the market with the government (Appendix D).



Picture 4. Rock falling on the high way to Thimphu due to the heavy rain.

4.5. Retailers (BCOOP, YBC, Grocery Stores)

Egg retailers can be classified into two types, cooperative and private businesses. Business Cooperative (BCOOP) and Youth Business Cooperative (YBC) are two cooperatives that have several retail stores in Thimphu. These cooperatives supply their egg stock mainly from Relangthang, government egg farm in the south. Unlike cooperatives, grocery store retailers (private own business) in Thimphu purchase eggs from various places, Tsirang, Sarpang, and Babesa districts (Appendix E).

Retailers sell eggs to customers in both tray (30 eggs) and carton (210 eggs) and egg prices vary depending on many factors such as market situation, avian flu outbreak, and product quality. With these aspects, both cooperative and private retailers use different approaches to setup their retail price. Since the government does not set a national standard egg price, BCOOP fixes the retail price from the consultation with YBC and DoL, while YBC fixes the retail price based on market price survey and from consultation with YBC management board. Based on the interview, most of grocery stores fix the retail price by benchmarking with neighboring stores, some mark up a marginal profit amount depending on the price they bought from egg dealers (Appendix E).

In this study, egg retail prices were identified during the interviews. BCOOP set up their egg prices at Nu. 200 and Nu. 150 per tray or Nu. 1400 and Nu. 1200 per carton for big and small sized eggs respectively. Grocery store retailers set the price ranging between Nu. 200 to Nu. 230 per tray depending on location (Appendix E). Some grocery stores do not categorize eggs in size and only sell them at one rate. For information on market price, see Table 2.

Table 2. December 2016, egg prices according to survey in Thimphu.

Retailers	Farm gate Price/carton		Retail price/carton		Remarks
	Large Sized Eggs (Nu.)	Small Sized Eggs (Nu.)	Large Sized Eggs (Nu.)	Small Sized Eggs (Nu.)	
BCOOP	1365	1050	1400	1200	35 cartons are sold weekly per shop
YBC	1300	1100	1400	1225	CFM
	1300	1100	1500		Memorial Chorten
Grocery store	1350	1200	1500	1350	

Mentioning about egg price, the questionnaire asked retailers, “*Will it be a good idea if the government announce a uniform egg price?*” The survey from the retailers shows both favorable and unfavorable responses; however, it could be rational to assume the government fixing one fair market price by taking into account the entire production chain cost i.e. internal cost (production cost), external cost (transportation cost) (Appendix E).

Second question attempted to observe egg packaging from the retailer’s point of view. As aforementioned the majority of the eggs produced in Bhutan have no labeling (production and expiry dates) nor proper shockproof packaging. According to the survey, 9 out of 11 retailers responded that they believe the eggs would be able to sell at a higher price if the packaging is developed up to a required standard, apparent labels and robust package. However, the responsibility for improving the matter is rather in the hand of egg producers, not retailers themselves. The other two retailers had no comment on this aspect, and mentioned that it is a hard work and time consuming (Appendix E).

During the market survey, the author of this paper spotted one of the grocery store in downtown Thimphu. The shop owner reused plastic packaging from Kinder Joy chocolate eggs for her chicken eggs (Picture 5). She told the author that “*I just want to try new ideas, and I think it works quite well. Many of the customers have interest in this packaging.*” (Appendix E)



Picture 5. Plastic packaging from chocolate is reused for eggs.

4.6. Consumers (Households, Restaurant, and Hotel)

At household level, 1 to 6 trays of eggs were consumed monthly depending on the size of the family. This customer group purchases eggs from local grocery store, and in normal condition they would accept the price to be approximately Nu. 200 per tray. However, if the price goes up to Nu. 270 – 400 for any reason, they would become more hesitant in accepting this price (Appendix F). In general, at household levels eggs are simply cooked as egg pouch, boiled egg, omelet, fried rice, noodle, and soup. From the consumer interviews, it appeared that the majority of consumers are willing and able to pay a higher price for a high quality and standardized egg, good condition with labels in a robust packaging (Appendix F). Additionally, some respondents report that it is difficult to check egg quality since it is always covered under a cardboard (Picture 6 and 7).



Picture 6. A piece of a cardboard is used as a protection, but it is also make difficulty for consumers to check the quality of the eggs underneath.



Picture 7. Customers buy a tray of egg that covered under a cardboard from YBC retailer.

For restaurants and hotels, 7-10 trays of eggs were purchased monthly from grocery stores or directly from egg farms. Bakery shops have the highest consumption with the average of 4 cartons of egg per month. Those business enterprises would accept the price at approximately between Nu. 200 to 220 per tray, and would start perceive the price to be expensive once it goes up to around Nu.250 to 370. Like the household level, eggs are consumed as boiled, fired rice, soup, and omelet. Restaurants and hotels emphasize their strong concern on egg quality, size and hygiene. The research points out that these enterprises are able to cope with the price fluctuation considerably well, but nevertheless these business entities would have their operation disrupted under egg shortage condition, except for bakery shop, affected relatively less, who can bake cakes without eggs (Appendix F).

4.7. Supporting Stakeholders

4.7.1. Feed producers

Three animal feed producers, Karma, Samrat, and BMG, are supplying animal feeds all over Bhutan. However, Karma feed company has the major share in the livestock feed market. Monthly, Karma feed produces approximately 1500-1800 tons of feed for poultry. The primary feed ingredients are maize, soybean, and fishmeal, of which most is imported, unsystematically and untraceably, from India (Anon. personal communication 2016).

Poultry farmers have expressed their concern on increasing cost of feed, discontinuity of feed supply, and inconsistency on feed quality. Regarding feed quality, Animal Feed Analytical and Quality Assurance lab at Tamil Nadu Veterinary and Animal Sciences University, have studied and formulated the report on poultry feed from Karma Company. The analysis revealed as follows, starter feed contains protein content of 17.44% against the International standard at 18% to 20%, layer feed contains protein content of 16.81% against the International standard at 14.29% to 17.48%. However, there is no analysis of protein content in grower feed.

4.7.2. Regional Livestock Development Centers (RLDCs)

RLDC is a regional hub for livestock services to farmers across the region, and there are 4 RLDCs located in East, West, Central and South regions. The mandates for RLDC are to provide technical backstopping, subsidize packages and conduct field research activities (Ministry of Agriculture, 2009).

4.7.3. National Center for Animal Health (NCAH)

A national focal agency under DoL working and focusing on animal health is NCAH, which is responsible for planning, executing, and monitoring disease prevention and control measures. The agency is also involved in procurement and distribution of veterinary drugs and vaccines as well as laboratory services (BAFRA, 2015).

4.7.4. Department of Agriculture Marketing and Cooperative (DAMC)

DAMC is a marketing agency that helps and supports farmers in facilitating and providing registration for farmer groups and cooperatives. It also provides assistance in advertisement of local products through real time pricing information via website (<http://www.agrimarket.gov.bt/public>), specifically most of the products are from agricultural sector (RNR Sector, 2012).

4.8. Summary of the results

The below table 3 shows a bullet point summary of the issues and challenges of the egg value-chain in Bhutan. Possible solutions and suggestions will be discussed in the discussion section.

Table 3. Summary of issues and challenges in Bhutan egg value-chain.

Stakeholders	Issues and challenges
Parent stock	<ul style="list-style-type: none"> • Distant location of parent stock supplier • Limited routes for transporting of the consignment • High mortality of DOCs on arrival • Wellness of animals in transportation of DOCs
Government nucleus farm	<ul style="list-style-type: none"> • Lack of well-constructed vehicle for import of PS and DOCs • High mortality rate of DOCs within the country as a result of poor domestic road conditions • Inability to serve all DOC demands for layer • Disposition of male DOCs
Egg producers	<ul style="list-style-type: none"> • Challenges in acquiring layer DOCs in time • Expensive feed cost • Insufficient competencies and knowledge to manage farm efficiently

	<ul style="list-style-type: none"> • Intense market competition and declining market price of eggs with rising supply of eggs
Egg dealers (middlemen)	<ul style="list-style-type: none"> • Poor road conditions resulting delivery delay and egg spoilage • Short shelf life of eggs due to lack of appropriate storage facilities • Inadequate information on egg quality due to lack of labeling • Competitive market due to Government entity injection of eggs supply
Retailers	<ul style="list-style-type: none"> • Lack of appropriate storage facility to prolong shelf life of eggs • Competitive market and fluctuation of eggs price
Consumers	<ul style="list-style-type: none"> • Barrier to information on egg quality • Unattainability of segregated pricing of eggs according to size and quality

5. Discussion

Findings from the previous sections have shown constraints and challenges within the egg value-chain. Thus, the objective of this section is to seek potential solutions and provide ideas on improvement for the value-chain.

The summarized table (table 4) displays issues and challenges within the egg value-chain identified from the results. Each of which will be discussed in this section

Table 4. Summary of issues and challenges with potential solutions.

Stakeholders	Issues and challenges	Potential Solution
Parent stock	<ul style="list-style-type: none"> • Distant location of parent stock supplier • Limited routes for transporting of the consignment • High mortality of DOCs on arrival • Wellness of animals in transportation of DOCs 	5.1 Animal Welfare - DOC transportation
Government nucleus farm	<ul style="list-style-type: none"> • Lack of well-constructed vehicle for import of PS and DOCs • High mortality rate of DOCs within the country as a result of poor domestic road conditions 	5.1 Animal Welfare – DOC transportation
	<ul style="list-style-type: none"> • Inability to serve all DOC demands for layer 	5.2 Supply of Layer DOCs
	<ul style="list-style-type: none"> • Disposition of male DOCs 	5.3 Male DOC Utilization
Egg producers	<ul style="list-style-type: none"> • Challenges in acquiring layer DOCs in time 	5.2 Supply of Layer DOCs
	<ul style="list-style-type: none"> • Expensive feed cost 	5.4 Feed
	<ul style="list-style-type: none"> • Insufficient competencies and knowledge to manage farm efficiently 	5.5 Farm management & communication
	<ul style="list-style-type: none"> • Intense market competition and declining market price of eggs with rising supply of eggs 	5.2 Supply of Layer DOCs
Egg dealers (middlemen)	<ul style="list-style-type: none"> • Poor road conditions resulting delivery delay and egg spoilage • Short shelf life of eggs due to lack of appropriate storage facilities • Inadequate information on egg quality due to lack of labeling 	5.6 Egg labeling & Egg grading
	<ul style="list-style-type: none"> • Competitive market due to Government entity injection of eggs supply 	5.7 Competitive egg market driven by the government
Retailers	<ul style="list-style-type: none"> • Lack of appropriate storage facility to prolong shelf life of eggs 	5.6 Egg labeling & Egg grading
	<ul style="list-style-type: none"> • Competitive market and fluctuation of eggs price 	5.2 Supply of Layer DOCs 5.8 Egg price fluctuation
Consumers	<ul style="list-style-type: none"> • Barrier to information on egg quality • Unattainability of segregated pricing of eggs according to size and quality 	5.6 Egg labeling & Egg grading 5.9 Consumer awareness and education

5.1. Animal welfare - DOC transportation

The Bhutan egg value-chain relates to animal welfare issues from the very beginning of the value-chain, the import of PS DOCs from India. Long transport duration and improper design of vehicles are assumed to be factors contributing to the high mortality rate of PS DOC upon arrival of approximately 5%. The loss of DOCs does not only have negative impacts on the welfare of the animals, but also results in a higher cost for the government.

Elaborating more on the mortality rate on arrival. Although this number was reported by the Department of Livestock, it is possible that the actual mortality rate upon arrival could be higher and differ across all nucleus farms because the transport durations of each nucleus farm could vary from 27.9 hours to 51.6 hours. In addition, the mortality rate upon arrival should not be the only measurement index, but survival rate (after a few days of the arrival) is also another index that should be considered in determining the success of the transportation.

The EU animal welfare directive on DOC transportation and a report from the European Animal Welfare Platform (EAWP) could provide guidelines on this issue. Both documents suggest that vehicles used for the delivery of DOC should have an environmental control system where prevailing conditions are set for the DOCs. At the same time, the driver should be well informed on the temperature inside the load and be well prepared for any emergency or possible delays from the scheduled journey. There are two dimensions to measure animal welfare in DOC transportation. The first one is based on resources. For example, vehicle for the delivery should have a proper ventilation system, suitable temperature, and the use of appropriate containers (box or tray) for carrying the DOCs. The second is animal based and refers to number of alive or dead DOCs upon arrival and transportation time. The EAWP report on animal welfare, suggests that all of the data related to the number of alive or dead DOCs on arrival, transport time, temperature, and type of vehicle should be submitted back to the supplying company; thus, this information could be used for future improvement between the hatchery and nucleus farm (EAWP, 2012). For more information on animal welfare legislation please find¹²³.

5.2. Supply of layer DOCs

In many other countries, layer DOCs for commercial egg farms are generally sold and provided by poultry companies under contract farming schemes. In Bhutan, egg farmers only receive layer DOCs from the government. Each year the government faces a difficulty in the projection and supply of layer DOCs to all egg farmers across the country, not because of a deficiency in DOCs production, but because of the fluctuation of demand for layers each year, which to some extent, correlates with egg price variation in the country.

For example, when eggs are highly demanded in the market, the price start to rise. Many Bhutanese then see this as an opportunity to start an egg business. Consequently, the government cannot supply layer DOCs to all farmers all at once and this causes a delay in delivery of DOCs. According to the interviews, the delivery took 2 weeks up to 5 months after the request. Once layers start to produce eggs, the supply exceeds the market demand and the price then starts to decline. As a result, many quit the business. The same cycle happens again when there is less eggs in the market.

To improve the situation, the government could try to use a contract farming technique. In other words, each egg farmer has to sign and register in order to be a legitimate egg producer and receive layer DOCs from the government. With proper registration, this could provide an estimation for the government to conduct planning and projection in producing layer DOCs for egg producers, and

¹ Council Regulation (EC) No 1/2005 of 22 December 2004, Protection of animal during transport

² Amending directives 64/432/EEC and 93/119/EC

³ Regulation (EC) No 1255/97

prevent the uncontrolled growth in number of producers. The registration could also improve the problems of inability to fulfill DOC demands and egg prices fluctuation within the country.

5.3. Male DOC utilization

Thailand is one of the biggest poultry producers in South East Asia region. In 2012 alone, Thailand produced ~1.5 million tons of broiler meat and 1.1 billion eggs. Presently, male DOCs with layer genetics in Thailand can be raised as broiler because it provides unique tenderness in meat and at the same time there is also a strong demand in the market. Most of these chickens are cooked as roasted chicken and served with spicy papaya salad, which is one of the most famous traditional dishes in Thailand. Furthermore, this roasted chicken is also popular among Laos, Vietnamese, Cambodia people as well as Chinese. With these opportunities, Thai poultry companies have developed special feed that contain optimal energy dosages for these DOCs, and it requires less protein and energy compared to commercial broilers. As a result, the cost of this special feed is cheaper relative to normal broiler commercial feed. With the special feed, the male DOCs are commonly fed for 60 days to reach up the weight of 0.8-1.2 kg before being slaughtered (Soisontes, 2015).

For Bhutan, raising male chicks with layer genetics could also be an opportunity to secure food security because male layer DOCs are currently still being disposed, and Bhutan still imports a lot of meat products from external sources. As aforementioned, feed and fodder for male DOCs with layer genetic requires less protein and energy; thus, household waste and other substitutions could also be used to raise these birds. However, the uses of household waste should also focus on hygienic and quality aspects before the implementation as they could be source of diseases and attract disease vectors like rats, birds, or insects.

5.4. Feed

The majority of poultry farmers in Bhutan are considered as small scale farmers and most of them are commonly encountering problems gaining access to egg markets, skills, knowledge, and technology (FAO, 2004). Most egg farmers in Bhutan are raising an exotic breed, Hy-line Brown and Hy-line Sliver Brown, provided by the government. These breeds have better laying performance than the local breed; however, they also need to consume higher quality feed compared to local ones. As exotic breeds require better feed quality, farmers have to fulfill this need; otherwise, only a few birds in production will perform up to standard level while the rest would end up underperforming (FAO, 2004). Since Karma feed company more or less monopolized the feed market in Bhutan, the company imposes strong influence on feed prices in the country. Almost all the respondents from the interviews reveal that feed price today is expensive and many of them are suffering from higher cost of production. With this constraint, there are few possible solutions to improve the situation.

First, technical guidance from FAO, suggests that local ingredients can be used to dilute the cost of commercialized feed. For example, cassava, sweet potato, coco yam, arrowroot, coconut residue, palm oil, and etc. are good sources of energy substitution that can be used along with commercial feed, if is processed scientifically. For protein substitutions, earthworm meal, maggot meal, winged bean, pigeon pea, and concentrated leaf protein are good alternatives. Not only crops and animals, also organic wastes from households and by-product from local industries like breweries could be possible substitutions for commercial feed. Lastly, FAO mentions that the key remedy to the situation is that farmers in different regions, together with local authorities (for Bhutan it could be DoL and RLDCs), must accurately identify possibilities and availability of these feed substitutions. However, the substitutions should be processed properly under scientific supervision considering the quality, hygienic aspect, and availability of those substitutes in the area (FAO, 2004).

Based on the author's experiences when working in Bhutan, the by-product from Royal Bhutan Army brewery in the Southern part of the country where it produces "K5" whisky or beer breweries could be a good place to start this kind of feed substitutions.

Secondly, the government could promote competitiveness in the feed market and this could be carried out by providing intensive, subsidy, or tax benefit in feed businesses.

5.5. Farm management and communication

This study will not go into technical details using international standards that require huge investment on how farm management should be done as the majority of egg producers in Bhutan are small scale farmers. Therefore, the primary concern is to ensure that these farmers have access to basic knowledge, develop management skills, and are able to utilize local resources efficiently.

Although egg farms in Bhutan are no longer using battery cages system since 2012, and Bhutanese egg producers are more aware on animal welfare aspects, most of them are not yet bound by international or high standard operating procedure (in farm management) as many farmers still cannot perform basic farm management tasks, one of which is farming record. Therefore, it can be assumed that there are diverse management practices throughout the country. Best practices for farm management can be discovered easily by people who have good accessibility to information sources. However, small scale farmers do not have the opportunity to gain insight in this information. Thus, government bodies, DoL, RLDCs, and NCAH, might be the key responsible agents that should deliver important information for the farmers to shift to a higher standard farm management and animal welfare. Easy to understand communication tools like infographic, animation, cartoon booklet, and documentary movie could possibly be effective.

Communication alone might not be enough, and training for farm management arranged by the government could be another option to consider. The statistical data from the Department of Livestock in 2015, showed that there were only 774 layer farms in Bhutan. This can be a good start to initiate new techniques in delivery knowledge and skills as the number of farms is still small. In the end, once the message has reached the farmers, regulation and monitoring system should then be in place to ensure that new practices are fully applied at ground level.

5.6. Egg labeling and egg grading

At the moment the majority of eggs in Bhutan are not properly labeled and graded in terms of size and quality. Consumers are hardly able to know the freshness of eggs, and sometimes they even experience egg spoilage from the market. Luckily, in Bhutanese food culture, eggs are cooked with high heat which can reduce the risk of food poisoning.

The government does not only own the nucleus farms, but also egg farms in many parts of the country. The government should therefore be the one who initiates systematic practices in egg labeling and egg grading. According to the interviews, eggs that are produced by government farms are mainly sold in BCOOP and YBC retailing stores. This is a good opportunity for the government to start implementing a labeling and grading system as a good example.

Surely, the implementation will require extra man hours and put higher cost for the production. However, consumer interviews conducted in this study revealed that, surprisingly, the customers are willing to pay for an extra price if the eggs are guaranteed to be in good condition.

Finally, the next step to make the labeling and grading system more sustainable is to enforce it by law and regulation.

5.7. Competitive egg market driven by the government

The domestic egg production in Bhutan is young and vulnerable, so the government is now playing both supporter and producer roles in order to secure and improve the situation. As a role of supporter, the government encourages local Bhutanese to start egg businesses by providing subsidized DOCs and technical supports. On the other hand, as a producer role, the government also produce eggs into the market in order to prevent egg shortage in the country.

In the interviews, some egg producers expressed that they are not happy with the government egg farms because it creates more competition in the egg market. There are two dimensions on this complaint; on one end the government is trying to ensure that Bhutanese will have an access to eggs all year round. On the other end, the government also put a pressure and increase competitiveness in egg market. However, one possibility is that the government should conduct a study and set up measurable and specific targets; e.g. the minimum number of egg farms in the country, or minimum number of eggs produced by local producers that can serve and supply the domestic demand, whenever the targets are achieved, enough eggs for domestic consumption, the government should then stop producing eggs and play a role of policy maker instead.

5.8. Egg price fluctuation

Today Bhutan no longer imports eggs from elsewhere as domestic production and domestic demand are matched. However, domestic egg price has still fluctuated through years. One of the reasons is that domestic egg production in Bhutan is still subjected to many volatile factors as aforementioned.

For this reason, referring to the interviews, many egg producers want the government to announce a uniform price of eggs in order to reduce the fluctuation in egg price. This could be one of the policies to be implemented along with proper registration mentioned above.

5.9. Consumer awareness and education

Every time when Bhutanese consumers purchase eggs from nearby stores they are confronted with the fact that they have no information regarding the egg quality. Not only they lack information, but are also forced, by market condition, to accept the price fluctuation throughout the year. These problems could be solved in many directions, one of which is the government could play a critical role as policy maker to control the quality and enforce labeling. For price fluctuation in the market, as mentioned earlier, the supply of layer DOCs from the government nucleus farms should be consistent and punctual, to keep the production of eggs continue smoothly through out the year.

According to the statistic from the Department of Livestock, Bhutanese consume on average 90 eggs per year per person and this is considered as a low consumption rate relative to other countries; for example, in 2016 on average a Swedes consumed about 14.9 kilogram of eggs (~248.3 eggs) per year (Jordbruksverket, 2017). As the domestic consumption and egg demand are low, it could be assumed that Bhutanese consumers are not paying much attention to egg quality, making the demand for quality eggs from the market being less concerned. Therefore, the implementation for future development in the value-chain such as labeling and grading system should also be demanded from the consumers' side in order to encourage future improvement in the egg value-chain.

6. Conclusion

The egg value-chain in Bhutan is unique because of the country's geography, culture, and religion. Yet there are loads of opportunities for future improvement of the value-chain. Future improvement and development are not only the responsibility of the government, but also the responsibility of all Bhutanese including religious bodies. Eggs is one of the cheapest sources of protein that can easily be produced within a short period of time and could also create job opportunities. Although egg is not yet a very popular food in Bhutan as the average egg consumption is low, eggs could play an important role in securing the country's food security, providing nourishing nutrition, and jobs for the people.

In order to improve the egg value-chain in Bhutan, all stakeholders should work together using interdisciplinary approach, the combination of people in different working fields work together to solve one same problem, to understand the actual situation and what should be done in the future. The discussion in this paper are ideas from an outsider who has only stayed in Bhutan for 5 months and there is limitation within this study. Therefore, in-depth analysis and studies are still needed in order to identify the root cause of the problems. Once the problems are further detailed, prioritizing each issue based on the significance effects it imposes onto the country should be taken into account along with the limitation in resources (man hours, funding, or skills). However, sometimes it could be good to start solving the problem that can be done easily and use less inputs because it could create motivation and positive energy for working team before dealing with more complicated tasks in the future.

7. Acknowledgement

First of all, I would like to express my appreciation to Professor Harry Blokhuis (thesis supervisor), Professor Stefan Gunnarsson (thesis evaluator), and Professor Ragnar Tauson for all of the supports in making this thesis paper complete. Without your suggestions, it would be difficult and time consuming for me to complete this Master program within this limited time.

Secondly, my gratitude goes to Bhutanese officials, His Excellency Yeshey Dorji (Minister of Agriculture and Forests), Dr. Tashi Samdup (Director General of Department of Livestock), Mr. Naiten Wangchuk (Chief Livestock Officer), and Mr. Chencho Tshering (Poultry Livestock Officer), in providing the great opportunity to live and learn in your beautiful country, and assisting in accessibility to all relevant data and insight information used in this paper.

Thirdly, the same gratitude goes for my two uncles, Dr. Vishnu Songkitti and Mr. Vanus Taepaisitphongse, for the inspiration and positive energy. Truly, both of you are my role model in making the world a better place without asking anything in return.

Last but not least, my families in Thailand (Bangkok and Maha Sarakham), a family in Sweden, and the last one in Bhutan. Without your endless love and unconditional support, nothing in my life would be considered valuable. Thus, I would like to devote all of the good merit I have made to all of my families and loved ones.

To those whose names are not mentioned in this acknowledgment, I am thankful for your kind support and friendship.

8. References

- Allison, E. (n.d.). *Gross National Happiness and Biodiversity Conservation in Bhutan*. 1st ed. p.1162.
- Asian Development Bank (2015). *The Experience of Gross National Happiness as Development Framework*. ADB South Asia Working Paper Series, pp.8,14.
- Banerjee, A. and Bandopadhyay, R. (2016). Biodiversity Hotspot of Bhutan and its Sustainability. *Current Science*, 110(4), pp.521-525.
- Bhutan Agriculture and Food Regulatory Authority (2015). *IN-COUNTRY LIVESTOCK BIOSECURITY GUIDELINES - Ministry of Agriculture and Forests Royal Government of Bhutan*. p.34.
- Centre for Bhutan Studies & GNH Research (2016). *2015 GNH SURVEY REPORT*. A Compass Towards a Just and Harmonious Society. Thimphu, pp.19, 20, 27, 28, 48, 51, 53, 54, 56, 60, 69, 70, 80, 81.
- Dema, K. (2015). No slaughterhouse, govt. clarifies. *kuenselonline*. [online] Available at: <http://www.kuenselonline.com/no-slaughterhouse-govt-clarifies/>
- Department of Livestock, Ministry of Agriculture and Forests, (2015). *Livestock Statistics 2015*. Thimphu, p.24.
- Department of Revenue & Customs (2016). *BHUTAN TRADE STATISTICS 2015*. Ministry of Finance Royal Government of Bhutan. p.16.
- Department of Revenue & Customs, (2016). *Bhutan Trade Statistics 2015*. Thimphu: Ministry Of Finance Royal Government of Bhutan.
- EAWP (2012). *Egg Production Strategic Approach Documents*. European Animal Welfare Platform: adding welfare quality to food EAWP. pp.23, 24.
- Evans, A., and M. Miele. 2007. *Consumers' Views about Farm Animal Welfare. Part I: National Reports based on Focus Group Research. Welfare Quality Report Series No.4*. Cardiff: Cardiff University.
- FAO (2004). *Small-Scale Poultry Production (Technical Guide)*. Rome, Italy, pp.16-22.
- Fraser, D. (2008). Understanding animal welfare. *Acta Veterinaria Scandinavica*, 50(Suppl 1), p.S1.
- Gnhcentrebhutan.org. (2017). *Four Pillars and Nine Domains | GNH Centre Bhutan*. [online] Available at: <http://www.gnhcentrebhutan.org/what-is-gnh/four-pillars-and-nine-domains/>.
- Gnhcentrebhutan.org. (2017). *GNH Today | GNH Centre Bhutan*. [online] Available at: <http://www.gnhcentrebhutan.org/what-is-gnh/gnh-today/>.
- Humane Society International (2012). *Bhutan Bans Extreme Confinement Cages for Egg-Laying Hens*. [online] Available at: http://www.hsi.org/news/press_releases/2012/08/bhutan_cage_free_080212.html.
- International Hydropower Association, (2016). *Hydropower Status Report*. pp.64-65

Jansson, D. (2016). Egg production in Sweden after the change to alternative housing systems, part 1. Housing of laying hens and current.

Jordbruksverket (2017). Marknadsrapport ägg - utvecklingen fram till 2016 Jönköping mars 2017. p.1.

Kjørstad, I. (2005) Consumer Concerns for Food Animal Welfare. Part I-A. Literature Reviews. In J. Roex and M. Miele eds. *Farm Animal Welfare Concerns. Consumers, Retailers and Producers. Welfare Quality Reports Series No.1*, Cardiff: Cardiff University.

Labour Market Information and Research Division Department of Employment Ministry of Labour and Human Resources, (2015). *LABOUR FORCE SURVEY REPORT 2015*. p.10.

Ministry of Agricultural and Forests. (2017). *Department of Livestock*. [online] Available at: <http://www.moaf.gov.bt/agencies/department-of-livestock/dol-about-us/>.

Ministry of Agriculture (2009). *National Extension Policy of RNR Sector of Bhutan*. p.17.

National Biodiversity Centre, Ministry of Agriculture and Forests, Royal Government of Bhutan, (2014). *National Biodiversity Strategies and Action Plan of Bhutan 2014*. pp.12-22.

National Statistics Bureau (2016). *National Accounts Statistics 2016*. Thimphu, p.20, 23.

National Statistics Bureau, (2016). *National Accounts Statistics 2016*. Thimphu : Bhutan: Royal Government of Bhutan, p.xiii.

Policy & Planning Division (PPD) and Ministry of Agriculture and Forests (MoAF) (2010). *Food security and food self-sufficiency in Bhutan, As part of the joint SDC-IFPRI-Bhutan project "Agricultural and Food Policy Research and Capacity Strengthening"*. pp.14, 16.

RNR Newspaper (2013). Bhutan and Avian Influenza - A monthly publication of the Ministry of Agriculture and Forests. [online] Available at: <http://www.moaf.gov.bt/download/Publications/RNR%20Newsletter%20September%202013.pdf>.

RNR Sector Ministry of Agriculture and Forests (2012). *11th Five Year Plan (2013-2018)*. Thimphu, pp.18, 19, 27, 28, 41, 42, 43, 44, 72, 76, 195.

ROYAL GOVERNMENT OF BHUTAN, (2012). *Bhutan: In Pursuit of Sustainable Development NATIONAL REPORT FOR THE UNITED NATIONS CONFERENCE ON SUSTAINABLE DEVELOPMENT 2012*. p.V. [online] Available at: <https://sustainabledevelopment.un.org/content/documents/798bhutanreport.pdf>

Schroeder, K. (2015). Cultural Values and Sustainable Tourism Governance in Bhutan. *Sustainability*, 7(12), pp.16616-16625.

Soisontes, S. (2015). An alternative use of one day-old male layer chicks: the case of Thailand. *Wing*, pp.1, 2, 3.

Sonaiya, E. and Swan, S. (2004). *Small-scale poultry production*. Rome: Food and Agriculture Organization of the United Nations.

Tashi, T. (2009). Commercial chicken production in Bhutan Will social and religious sentiment allow the development?. *Van Hall Larenstein University of Applied sciences*, p.27.

UN Resident Coordinator for Bhutan, (2016). *Bhutan: Flash Floods - Situation Report*. No 4. [online] Available at: <http://reliefweb.int/report/bhutan/bhutan-flash-floods-situation-report-no-4-29-july-2016>.

United Nations Development Programme, (2013). *Millennium Development Goals (MDG) Acceleration Framework: YOUTH EMPLOYMENT IN BHUTAN*.

United States Department of Agriculture (2017). *World Agricultural Supply and Demand Estimates*. p.33.

United States Department of State, (2015). *BHUTAN 2015 INTERNATIONAL RELIGIOUS FREEDOM REPORT*.

Van Horne, P. and Achterbosch, T. (2008). Animal welfare in poultry production systems: impact of EU standards on world trade. *World's Poultry Science Journal*, 64(01), pp.40-52.

Wangchhuk, L. (2010). *Facts about Bhutan*. 1st ed. Thimphu, Bhutan: Absolute Bhutan Books, p.56.

Wangchuk, N. (2016). *Appraisal Report of Egg Farming In Bhutan*. [Unpublished Data]

Wangdi, K. (2015). *Overview of Poultry Sector Development in Bhutan*. [Unpublished Data]

World Bank, (2009). *Nutrition at a Glance Bhutan*. [online] Available at: <http://siteresources.worldbank.org/NUTRITION/Resources/281846-1271963823772/Bhutan4811screen.pdf>.

World Bank, (2017). *Gross domestic product 2015*. p.3.

Zangmo, U., de Onis, M. and Dorji, T. (2012). The nutritional status of children in Bhutan: results from the 2008 National nutrition survey and trends over time. *BMC Pediatrics*, 12(1).

Appendix A



Species: Avian

Strain: Hy-line Brown

Origin: America

Laying period: 57 weeks

Production performance:

- Superior egg production (Peak at 95%)
- Excellent livability (85%)
- Unsurpassed feed efficiency
- Excellent temperament
- 78% Hatchability

Average Daily Feed Consumption: (18–90 weeks): 105–112 g/day per bird

Feather color: Brown (female), White (male)

Body weight (Female)

- 1.4 kg (17 weeks)
- 1.9 kg (40 weeks)

Body weight (Male)

- 2.09 kg (17 weeks)
- 2.68 kg (40 weeks)

Feed consumption/bird/house

- 5.97 kg (1-17 weeks)
- 111 g (18-75 weeks)

Purpose: For commercial layer egg production

Appendix B



Species: Avian

Strain: Hy-line Silver Brown

Origin: America

Laying period: 80 weeks

Production performance:

- Superior egg production (96% at peak)
- Excellent livability (97%)
- Great Egg quality
- Docile temperament
- Good body weight at end of lay

FCR: 2 kg of feed/kg of eggs

Feather color: White with brown tint (Female), Brown (male)

Body weight: 1.54 kg (17 weeks), 1.9 kg (32 weeks) 2.1 kg (70 weeks)

Purpose: For commercial layer egg production

Appendix C
(Egg Producers Interviews)

Date/Time: 23DEC2016 / 09:30

Type of respondents: Producers (Cooperative member)

Interview location: Telephone Interview

Respondents Details

Name/Age: Deli Ram / 49

Farm name: Deli Ram farm

Location/Contact: Tsirang / 17725873

Member in cooperative: About 100 members

How the group initiated?: Own initiative and support from DoL

Benefit of being in the group/cooperative: Advantages in marketing and mobilization of feed

Details of Farm

1) Total farm capacity?, current total bird?, and number of flock?

- 3000 birds / 2000 birds / 3 flocks

2) Total eggs production per day?

- 5 cartons.

3) Availability of supplies (input)

DOCs (is it on time?)

- *"It's very difficult to get DoC on time and the process takes around 2-4 weeks. Presently, I purchased BV380 DOCs from private supplier (Gautum poultry at Nu.48 per DOC)."*

Feed (is it in good quality?)

- Available / *"increase in feed prices is the problem."*

Technical backstopping (is it enough?)

- Available / *"it is on time."*

Drugs and vaccine (is it enough?)

- Available / *"it is on time."*

4) Are there any future farm expansion and why?

- *"Yes, if there are more stocks of layers then it means cost of production per bird will be reduced. Once production cost per bird is reduced, we can have more profits."*

5) What are the problems you encounter in running the farm?

- Animal feed is expensive.
- Limitation of construction materials and land for extension.

6) Do you carry out basic farm recording and do you think it is important or not?

- *"No, but I know it is important to do because we can calculate the feed consumption by the birds and future projection of the production."* (I received this information by DoL training)
- *"I asked my wife to do the recording because I need to deliver the eggs to many places, however she does not know how to write."*

7) How do you select the feed for your layers?

- *"It depends on the situation. Originally, I choose Karma pellet feed, but now I switch to mesh feed because egg market price is low then I have to minimize my production cost."*

8) After completing the production, what do you do with bedding litter?

- *"I sell them in separated portion, a size of feed bag, to nearby farmers as."*

Marketing aspect

- 9) Availability of egg markets
- *“Currently there is no market for eggs and is very difficult to sell. There are lots of eggs supplied in the market.”*
- 10) How do you check the current market price of eggs?
- *“I asked my friends.”*
- 11) Who do you sell your eggs to?
- Egg dealers - 0%
 - Retailers - 100% (*“I deliver eggs directly to retailers.”*)
 - Consumers - 0%
- 12) What is your farm gate price?
- Per tray (30eggs) – *“I only sell in carton.”*
 - Per carton (210eggs) - Nu. 1200
- 13) What is your selling prices per carton, if you sell to
- Egg dealers -
 - Retailers - Nu. 1300 (the price is fluctuated in the market)
 - Consumers -
- 14) What type of problems do you encounter in the market?
- *“There is a price competition in the market and there should be a uniform rate for Tsirang and Sarpang layers farmers.”*
- 15) What type of egg market intervention required from the government?
- Public and government partnership.
 - Announcement of a uniform rate by the government.
- 16) Do you grade your eggs and mark the production deadline?
- *“There is no labeling (MFG and expiry date) at farm level; however, I deliver eggs every 6 days to Thimphu.”*

Date/Time: 23DEC2016 / 10:00
Type of respondents: Producers (Cooperative member)
Interview location: Telephone Interview

Respondents Details

Name/Age: Dewan Pradan / 51
Farm name: DSA poultry farm
Location/Contact: Tsirang / 17641588
Member in cooperative: About 100 members
How the group initiated?: Own initiative and support from DoL
Benefit of being in the group/cooperative: Advantages in marketing and mobilization of feed

Details of Farm

- 1) Total farm capacity, current total bird and number of flock
 - 2000 birds / 800 birds / 1 flock
 - *"I just sold 1200 birds because egg farming is not profitable."*
- 2) Total eggs production per day?
 - 2 cartons and 4 trays.
- 3) Availability of supplies (input)
 - DOCs (is it on time?)
 - Available / *"It is very difficult to get DOCs on time and it takes around 2-4 weeks."*
 - Feed (is it in good quality?)
 - Available / *"Feed price is expensive."*
 - Technical backstopping (is it enough?)
 - Available / *"It is on time."*
 - Drugs and vaccine (is it enough?)
 - Available / *"It is on time and sufficient."*
- 4) Are there any future farm expansion and why?
 - *"No, eggs market price is low and feed cost is high."*
 - *"I want to quit from this business."*
- 5) What are the problem you encounter in running the farm?
 - *"Eggs market price is low."*
- 6) Do you carry out basic farm recording and do you think it is important or not?
 - *"Yes, because it helps in carrying out farm management and marketing."*
- 7) How do you select the feed for your layers?
 - *"I choose by quality because it increases the production performance and reduce pecking problem."*
- 8) After completing the production, what do you do with bedding litter?
 - *"I sell them to nearby farmers as fertilizer."*

Marketing aspect

- 9) Availability of egg markets

- *"Now there is no market for eggs."*
- 10) How do you check the current market price of eggs?
- *"I directly sell to retailers in Wangdue and Punakha, and the price is based on the retailers."*
- 11) Who do you sell your eggs to?
- Egg dealers - 0%
 - Retailers - 100% (at Nu. 1300 per carton)
 - Consumers - 0%
- 12) What is your farm gate price?
- Per tray (30 eggs) - *"I only sell egg to retailers."*
 - Per carton (210 eggs) - *"I only sell egg to retailers."*
- 13) What is your selling prices per carton, if you sell to
- Egg dealers -
 - Retailers - Nu. 1300
 - Consumers -
- 14) What type of problems do you encounter in the market?
- *"Eggs market price is low."*
 - *"I do door to door selling service, so there are extra costs in transportation."*
- 15) What type of egg marketing intervention required from the government?
- The government should announce uniform rate price for eggs.
 - The government should buy eggs from the farmers.
- 16) Do you grade your eggs and mark the production deadline?
- *"I don't do grading and put labeling on eggs."*

Date/Time: 23DEC2016 / 10:30
Type of respondents: Producers (Cooperative member)
Interview location: Telephone Interview

Respondents Details

Name/Age: San Bdr / 63

Farm name: San Bdr farm

Location/Contact: Sarpang / 17694943

Member in cooperative: 100 members in cooperative and 250 people are not in the group

How the group initiated?: Mobilization and group formation were encouraged and formed by District livestock office under DoL.

Benefit of being in the group/cooperative:

- The cooperative collects eggs from members and resell into the market (However, since November 2016, the cooperative stops collecting eggs because of egg market price is low.)
- Advantages in mobilization of cartons and trays.

Details of Farm

1) Total farm capacity, current total bird and number of flock

- 5000 birds / 5000 birds / 3 flocks

2) Total eggs production per day?

- 11 cartons.

3) Availability of supplies (input)

DOCs (is it on time?)

- Available / *"It is very difficult to get DOCs on time and after requisition it took more than 2 months to get the birds."*

Feed (is it in good quality?)

- Available / *"Limited supply from the feed producers."*

Technical backstopping (is it enough?)

- Available / *"It is on time."*

Drugs and vaccine (is it enough?)

- Available / *"It is on time and sufficient."*

4) Are there any future farm expansion and why?

- *"I am willing to do the expansion only if the egg price is favorable."*

5) What are the problem you encounter in running the farm?

- *"Eggs market price is low."*
- *"Feed price is expensive and government should subsidize the feed cost."*

6) Do you carry out basic farm recording and do you think it is important or not?

- *"Yes, because it helps to understand farm management."*

7) How do you select the feed for your layers?

- By quality (*"Now I use Karma feed"*.)
 - *"BMG feed caused diarrhea on my birds as well as poor production performance."*

8) After completing the production, what do you do with bedding litter?

- *"I sell them to nearby farmers at the rate of Nu. 60 per bag, excluding transportation cost."*

Marketing aspect

9) Availability of egg markets

- *“There is no market for eggs.”*

10) How do you check the current market price of eggs?

- *“I called and asked my relatives who live in Thimphu and Wangdue to check the price in the market.”*

11) Who do you sell your eggs to?

- Egg dealers - 100%
- Retailers - 0%
- Consumers - 0%

12) What is your farm gate price?

- Per tray (30 eggs) -
- Per carton (210 eggs) - Nu. 1100

13) What is your selling prices per carton, if you sell to

- Egg dealers – Nu. 1100 to Nu. 1300
- Retailers -
- Consumers -

14) What type of problems do you encounter in the market?

- The price is based by dealers.
- Egg dealers are not consistent in buying eggs.

15) What type of egg marketing intervention required from the government?

- The government should announce uniform rate price for eggs, if the price is acceptable then I want to sell to the government.
- The government can support the cooperative to have retail stores in potential districts.
- Good and potential market should be provided by government.

16) Do you grade your eggs and mark the production deadline?

- *“I don't do grading and put labeling on eggs, but I deliver the egg every 1-2 weeks.”*

Personal comments

- *“Now we (Sarpang layer cooperative) want to sell our eggs directly to customers by having outlet at Thimphu and some potential areas. Soon we will propose this idea to DoL”*

Date/Time: 23DEC2016 / 15:30

Type of respondents: Producers

Interview location: Telephone Interview

Respondents Details

Name/Age: Chencho / 32

Farm name: Chencho farm

Location/Contact: Paro Khangkhu / 17600701

Member in cooperative: No (I am an individual producer with a license from Business Opportunity Information Center (BOIC - soft loan interest 4% annually))

How the group initiated?:

Benefit of being in the group/cooperative: *"I am able to get the loan and credit from BOIC."*

Details of Farm

1) Total farm capacity, current total bird and number of flock

- 1000 birds / 500 birds / 1 flock

2) Total eggs production per day?

- 2 cartons with 500 birds.
- 11 trays with spent birds.

3) Availability of supplies (input)

DOCs (is it on time?)

- Available / *"But not on time and it takes 2-3 weeks after requisition."*

Feed (is it in good quality?)

- Available / *"But quality is fluctuated."*

Technical backstopping (is it enough?)

- *"There are many information and suggestions from different supporting agents (BOIC, RLDC, District Livestock Sector, and National Poultry Farm). However, none of the agents delivered the similar suggestions. For example, BOIC suggested that the farm capacity should be 500 birds, but RLDC suggested that it should be 1000 birds."*

Drugs and vaccine (is it enough?)

- Available / *"It is enough. However, in some cases there are out of stock but it rarely happens."*

4) Are there any future farm expansion and why?

- *"As of now No, but after finish retiring the loan to BOIC maybe I will do some expansion."*

5) What are the problems you encounter in running the farm?

- Management problems.
- Egg market price is low.
- There should be a proper study on consumer pattern and number of producers of egg across the country.
- *"Government encourage people to start layer farms by providing subsidy; however, at the same time the government also starts layer farms. Thus, the farmers feel that this creates more competition in the market."*

6) Do you carry out basic farm recording and do you think it is important or not?

- Yes and it is very important for projection and understand the overview of farming situation.

- 7) How do you select the feed for your layers?
- There is no choice of selecting the feed. Karma feed is the only choice and the feed quality fluctuates.
- 8) After completing the production, what do you do with bedding litter?
- *"I sell to the nearby farmers at Nu.50, excluding transportation cost."*

Marketing aspect

- 9) Availability of egg markets
- *"There is no problem for me in selling eggs because I have signed a contract with Tashi Namgyel resort and Khangkhu resort. The payment is made on a weekly or a monthly credit."*
- 10) How do you check the current market price of eggs?
- *"First, I calculate the cost of production (feed, labor cost and other expenses) then mark up some margin."*
- 11) Who do you sell your eggs to?
- Egg dealers -
 - Retailers -
 - Consumers - 100% (Hotels)
- 12) What is your farm gate price?
- Per tray (30 eggs) - Nu. 270
 - Per carton (210 eggs) - Nu. 1800
- 13) What is your selling prices per carton, if you sell to
- Egg dealers -
 - Retailers -
 - Consumers - Nu. 1800 (until November 2016) and Nu. 1500 (in December 2016)
- 14) What type of problems do you encounter in the market?
- Today there are lots of competition in the market.
- 15) What type of egg marketing intervention required from the government?
- Feed price should be controlled by the government.
 - Feed quality analysis need to study.
 - Government can support farm management guidance.
 - Uniform rate of egg fixed by the government with proper calculation in district wise.
- 16) Do you grade your eggs and mark the production deadline?
- No because I finish all my stock, 6-7 cartons, within a week.

Personal comments

- *"I am holding a license for doing poultry business and I have to pay income tax. Therefore, I need tax exemption during my loan period."*
- *"To discard the spent birds, I sell them to Indian labors and it takes about 1-2 weeks to empty the stock."*

Date/Time: 24DEC2016 / 17:00

Type of respondents: Producers

Interview location: Telephone Interview

Respondents Details

Name/Age: Mr.Dorji / 34

Farm name: UgyenZ farm

Location/Contact: Radhi, Khadung, Trashigang / 17818344

Member in cooperative: No (Individual producer)

How the group initiated?: No

Benefit of being in the group/cooperative: No

Details of Farm

1) Total farm capacity, current total bird and number of flock

- 5400 birds / 5400 birds / 5 flock

2) Total eggs production per day?

- 1 carton and 5 trays from 500 birds.

3) Availability of supplies (input)

DOCs (is it on time?)

- Available / but not on time (It takes 4-5 months after requisition)

Feed (is it in good quality?)

- Karma feed quality is acceptable
- Pema feed company is a local feed company. *"However, the quality is not good, so we prefer to use Karma feed."*

Technical backstopping (is it enough?)

- *"It is enough and on time."*

Drugs and vaccine (is it enough?)

- Available and enough.

4) Are there any future farm expansion and why?

- *"Farm expansion will be done, only if there is still profits in the business. As of now I am thinking that my children should work in my farm."*

5) What are the problems you encounter in running the farm?

- *I need to sell eggs at Nu. 10 each to have profit because the market is very competitive comparing to eggs from Sarpang and Tsirang are sold only at Nu. 7-8 per egg..*

6) Do you carry out basic farm recording and do you think it is important or not?

- *"I did not do farm recording, since my wife is not well educated. However, I am aware that it is important to do."*

7) How do you select the feed for your layers?

- *"I prefer Karma feed as it has better quality compared to Pema feed."*

8) After completing the production, what do you do with bedding litter?

- *"I sell them to nearby farmers at Nu. 120 per bag, excluding a transportation cost."*

Marketing aspect

9) Availability of egg markets

- *“There is demand in the market, however I cannot sell eggs at good price.”*
 - *“Eggs from other districts make it more difficult for me to compete with their lower price.”*
- 10) How do you check the current market price of eggs?
- *“First, I calculate the cost of production (feed, labor cost and other expenses) then mark up the price accordingly for some profits.”*
- 11) Who do you sell your eggs to?
- Egg dealers - %
 - Retailers - 70%
 - Consumers - 30% (some they buy eggs directly from my farm)
- 12) What is your farm gate price?
- Per tray (30 eggs) - Nu. 270
 - Per carton (210 eggs) - Nu. 1680
- 13) What is your selling prices per carton, if you sell to
- Egg dealers -
 - Retailers - Nu.1680
 - Consumers - Nu. 1680
- 14) What type of problems do you encounter in the market?
- Today there are lots of competition in the market.
- 15) What type of egg marketing intervention required from the government?
- Feed price should be controlled by the government.
 - Egg dealers from other districts compete prices in my area.
 - There should be control of egg dealers from India since disease and outbreak can be picked up from India.
 - Uniform rate of egg price should be fixed by the government with proper calculation for each district.
- 16) Do you grade your eggs and mark the production deadline?
- *“No, because I can empty my stock within a week. I also have trademark for my eggs. However, production date is not included.”*

Appendix D
(Egg Dealers Interviews)

Date/Time: 23DEC2016 / 11:00

Type of respondents: Egg Dealers and Retailers

Interview location: Telephone Interview

Respondents Details

Name/Age: Mr Bimal / 24 years old

Hometown: Tsirang (South)

Shop Location: Lobeysa, Punakha

Contact: 17782352

- 1) From where do you buy eggs and how much?
 - Tsirang and Sarpang / 1300 per carton.
- 2) How many cartons do you buy per week?
 - 80-105 cartons per week.
- 3) Where do you sell the eggs?
 - Punatsangchu (Hydro project camp), Wangdue
 - Bajo town, Wangdue
 - Khuruthang town, Punakha
 - Thimphu
 - Paro
 - Eastern districts
 - Door to door service
- 4) How many years have you been involved in egg market?
 - 8 months.
- 5) Are you going to continue the business and why?
 - *"I am not sure."*
- 6) What type of problems do you encounter in egg transporting and being in egg market?
 - Eggs size fluctuation.
 - Egg market price fluctuation.
 - There are so many egg dealers and producers.
 - Summer time
 - o Difficulty in stocking the eggs because it is easily to be spoiled and road block could be happened.
- 7) Do you stock the eggs and sell them when the price is good? (if yes how long do you normally stock the eggs?)
 - *"No, I did not stock the egg. I sell it as soon as possible."*
- 8) Are you also an egg producers or a farm owner?
 - *"No, but I have a grocery store in Lobeysa, Punakha."*
- 9) What is the average time for you to resell the eggs to retailers?
 - 4 days
- 10) What type of government intervention would you prefer in egg marketing and transportation?
 - Fixed or uniform price both for producers and retailers. But ensure that there are some margins for profits.

Date/Time: 23DEC2016 / 15:00

Type of respondents: Egg Dealers and Retailers

Interview location: Telephone Interview

Respondents Details

Name/Age: Mr Rinzin Choda / 36 years old

Hometown: Dewathang, Samdrup Jongkhar

Shop Location: Dewathang, Samdrup Jongkhar (East)

Contact: 171131180

- 1) From where do you buy eggs and how much?
 - Relangthang Sarpang farm for Nu. 1323 per carton and Sarpang Cooperative for Nu. 1300 per carton.
- 2) How many cartons do you buy per week?
 - In the past, it was 105 cartons per week
 - *“Now since the situation is not good, egg market price is low, I only take 10-15 cartons.”*
- 3) Where do you sell the eggs?
 - Main town, Tashigang
 - Warong, Tashigang
 - Khaling, Tashigang
 - Rangjung, Tashigang
 - Tashiyangtse
 - Mongar
- 4) How many years you have been involved in egg market?
 - 1 year.
- 5) Are you going to continue the business and why?
 - Yes, if the business is profitable.
- 6) What type of problems do you encounter in egg transporting and being in egg market?
 - It takes longer time to resell the eggs.
 - Customers complain on eggs quality.
 - Sometimes eggs are sold by the government and at that time I cannot compete to sell the eggs.
- 7) Do you stock the eggs and sell them when the price is good? (if yes how long you normally stock the eggs?)
 - *“No, but if I cannot sell all the eggs to retailers then I keep them at my grocery store.”*
- 8) Are you also an egg producers/own the farm?
 - No .
- 9) What is the average time for you to resell the eggs to retailers?
 - 7-10 days.
- 10) What type of government intervention would you prefer in egg marketing and transportation?
 - No comment.

Personal Comments

- *“I normally keep my profits around Nu.200 per carton.”*
- *“I will only have profits when eggs are sold in Warong, Khaling, Main Town in Tashigang. However, the profits will be reduced when I have to deliver egg to Tashiyangtse and Mongar because of high transportation cost.”*

Appendix E
(Retailers Interviews)

Date/Time: 22DEC2016 / 09:08

Type of respondents: Retailer (Government Cooperative)

Interview location: Opposite to National Handicraft Emporium, Thimphu

Respondents Details

Name: Ms Sabitra Gurung

Retailer shop: BCOOP

Contact:

- 1) From where do you buy eggs and how much?
 - BCOOP purchases the eggs from Relangthang farm which is owned by the government.
- 2) What is the cost of the eggs you purchased from farms/dealers?
 - Nu. 1365 per cartons for big size eggs, excluding transportation cost.
 - Nu. 1050 per cartons for small size egg, excluding transportation cost.
- 3) What is the price do you sell to your customers?
 - Nu. 200 per tray for big size eggs and Nu. 150 per tray for small size eggs.
 - Nu. 1400 per cartons for big size eggs and Nu. 1200 per cartons for small size eggs.
- 4) How do you setup your eggs prices?
 - Egg prices are set up based on the consultation with YBC and DoL.
- 5) If the government announces/setup a uniform price for eggs, will this affect your business and is it a good idea or not?
 - It will affect my business, since the current price is fluctuated with the market force.
- 6) On average how many eggs do you sell per week?
 - On average 35 cartons per week.
- 7) If the eggs cannot be sold and get spoiled, what would you normally do?
 - Since July 2016, 72 cartons of eggs are spoiled in our stock. BCOOP is planning to deliver the spoiled eggs to calf rearing center as a feed supplement.
- 8) If you arrange eggs in proper packaging (well protected with manufacturing and expiry date), do you think you can sell eggs at higher price?
 - *"No comment because I have never experienced in selling packaged and labeled eggs."*

Date/Time: 22DEC2016 / 10:06

Type of respondents: Retailer (Fresh Market)

Interview location: Centenary Farmer's Market, Thimphu

Respondents Details

Name: Mr. Manada

Retailer shop: Centenary Farmer's Market

Contact: 17760885

- 1) From where you purchased eggs?
 - *"I own layers farm in Tsirang."*
- 2) What is the cost of the eggs you purchased from farms/dealers?
 - Cost of the eggs at farm gate price is between Nu. 1200-1300 per carton.
- 3) What is the price do you sell to your customers?
 - Nu. 200 per tray and Nu. 1400 per cartons.
- 4) How do you setup your eggs prices?
 - *"I set up the egg price based on COP, and I cannot sell the eggs below Nu. 200 per tray."*
- 5) If the government announces/setup a uniform price for eggs, will this affect your business and is it a good idea or not?
 - It will be a good idea to have a uniform rate.
- 6) On average how many eggs do you sell per week?
 - 3 cartons per week from the centenary market.
 - 20-30 cartons per week by door to door service with the same price as market.
- 7) If the eggs cannot be sold and got spoiled, what would you normally do?
 - *"So far there is no spoiled eggs and I am able to sell all the eggs I brought from my farm."*
- 8) If you arrange eggs in proper packaging (well protected with manufacturing and expiry date), do you think you can sell eggs with higher price?
 - It will be a good idea to have proper packaging and labeling for eggs. I would be able to implement it and mark up the price.

Date/Time: 22DEC2016 / 10:28

Type of respondents: Retailer (Fresh Market)

Interview location: Centenary Farmer's Market, Thimphu

Respondents Details

Name: Ms.Nim Dema (from Tsirang)

Retailer shop: Centenary Farmer's Market

Contact: -

1) From where you purchased eggs?

- *"I purchased eggs from Tsirang."*

2) What is the cost of the eggs you purchased from farms/dealers?

- Between Nu. 1200-1300 per cartons.

3) What is the price do you sell to your customers?

- Nu. 220 per tray and Nu. 1400 per carton.

4) How do you setup your eggs prices?

- *"I setup the egg price based on nearby shop selling rate and also from purchased rate from the dealers."*

5) If the government announces/setup a uniform price for eggs, will this affect your business and is it a good idea or not?

- It is a good idea to set up a uniform price, but transportation cost must be considered.

6) On average how many eggs do you sell per week?

- 20 cartons per week from the centenary market.
- 110-120 cartons per week by selling to shops in Thimphu and Paro.

7) If the eggs cannot be sold and got spoiled, what would you normally do?

- *"I have not experienced egg spoilage. It takes about 1 week to finish the stock."*

8) If you arrange eggs in proper packaging (well protected with manufacturing and expiry date), do you think you can sell eggs with higher price?

- *"I am not willing to have proper packaging since it is a hard work and time consuming."*

Personal comments

"I also sell local eggs (local breed) at Nu.300 per dozen and Nu 750 per tray."

Date/Time: 22DEC2016 / 10:45

Type of respondents: Retailer

Interview location: Centenary farmers market, Thimphu.

Respondents Details

Name: Ms. Pema Dema (from Samdrup Jongkhar)

Retailer shop: Centenary Farmer's Market

Contact: 17705113

1) From where you purchased eggs?

- *"I purchased eggs from Babeysa farm, Thimphu."*

2) What is the cost of the eggs you purchased from farms/dealers?

- Nu. 1300 per cartons including transportation cost.

3) What is the price do you sell to your customers?

- Nu. 200 per tray.
- Nu. 1500 per carton.

4) How do you setup your eggs prices?

- *"I set up egg prices by asking the prices from nearby shops."*

5) If the government announces/setup a uniform price for eggs, will this affect your business and is it a good idea or not?

- If the government announce a uniform egg price, the price should be at least Nu. 200 per tray.

6) On average how many eggs do you sell per week?

- *"I can sell 10 cartons per week to my regular customers who trust on my products."*
- *"Some of my customers state that sometime Tsirang eggs are spoiled; therefore, it is better to buy eggs from nearby district."*

7) If the eggs cannot be sold and got spoiled, what would you normally do?

- *"I have not experienced spoilage since I weekly stock eggs based on the demand."*

8) If you arrange eggs in proper packaging (well protected with manufacturing and expiry date), do you think you can sell eggs with higher price?

- *"I think packaging and labeling can encourage customers to buy and this should be implemented by producers."*

Date/Time: 22DEC2016 / 10:56

Type of respondents: Retailer (Youth Cooperative)

Interview location: Centenary farmers market, Thimphu.

Respondents Details

Name: Mr. Lhendup

Retailer shop: YBC

Contact: 17922192

- 1) From where you purchased eggs?
 - YBC purchased eggs from Tsirang.
- 2) What is the cost of the eggs you purchased from farms/dealers?
 - Nu. 1300 per cartons for big size eggs.
 - Nu. 1100 per cartons for small size eggs.
- 3) What is the price do you sell to your customers?
 - Nu. 200 per tray for big size eggs.
 - Nu. 175 per tray for small size eggs.
- 4) How do you setup your eggs prices?
 - YBC set up the egg prices by asking shops around Thimphu.
- 5) If the government announces/setup a uniform price for eggs, will this affect your business and is it a good idea or not?
 - It will affect my business since egg prices are fluctuated with market force.
- 6) On average how many eggs do you sell per week?
 - 105-110 cartons per week.
- 7) If the eggs cannot be sold and got spoiled, what would you normally do?
 - Eggs are sold to customers with discount.
- 8) If you arrange eggs in proper packaging (well protected with manufacturing and expiry date), do you think you can sell eggs with higher price?
 - Good packaging and production labeling are good idea; however, egg price has to be consistent with market situation.

Personal comments

- YBC have 3 outlets (Centenary Farmers Market, Memorial Chorten, Motithang) in Thimphu.
- There are total 13 active youth members and 3 of them are paid by Ministry of Labor and Human Resource (50% salary)

Date/Time: 22DEC2016 / 11;15

Type of respondents: Retailer

Interview location: Near to centenary farmers market, Thimphu.

Respondents Details

Name: Mr. Bal Bdr Tamang

Retailer shop: Open sale from truck.

Contact: 17718252

1) From where you purchased eggs?

- *"I purchased eggs from Tsirang."*

2) What is the cost of the eggs you purchased from farms/dealers?

- Nu. 1350 per carton.

3) What is the price do you sell to your customers?

- Nu. 200 per tray.
- Nu. 1400 per carton.

4) How do you setup your eggs prices?

- *"I set up the egg prices by asking shops in Thimphu."*

5) If the government announces/setup a uniform price for eggs, will this affect your business and is it a good idea or not?

- It is a good idea to have egg price set up by the government. So that there will be a uniform rate to all shops, and it will be more convenient for customers and retailers.

6) On average how many eggs do you sell per week?

- *"I can sell 15-18 cartons per week."*

7) If the eggs cannot be sold and got spoiled, what would you normally do?

- *"I have no spoiled eggs when I sell them to customers."*

8) If you arrange eggs in proper packaging (well protected with manufacturing and expiry date), do you think you can sell eggs with higher price?

- Packaging and labeling should be done by producers with supports from the government.

Personal comments

- *"Selling products at parking area nearby the market is illegal. However, I am willing to take the risk and I had already paid some fine to police."*
- *"On average, I loss about 2 trays of eggs from transportation."*

Date/Time: 22DEC2016 / 11:20

Type of respondents: Retailer

Interview location: Centenary Farmers Market, Thimphu.

Respondents Details

Name: Ms.Sigay Buthri

Retailer shop:

Contact: 17755079

- 1) From where you purchased eggs?
 - *"I purchased eggs from Tsriang and Sarpang."*
- 2) What is the cost of the eggs you purchased from farms/dealers?
 - Nu. 1250-1300 per carton.
- 3) What is the price do you sell to your customers?
 - Nu.210-220 per tray.
 - Nu.1350 per carton.
- 4) How do you setup your eggs prices?
 - *"I set up the egg prices based on purchasing rate from dealers and I also survey the price from shops around Thimphu."*
- 5) If the government announces/setup a uniform price for eggs, will this affect your business and is it a good idea or not?
 - *"It will affect my business."*
- 6) On average how many eggs do you sell per week?
 - 10-15 cartons per week.
- 7) If the eggs cannot be sold and got spoiled, what would you normally do?
 - *"I never experience spoiled eggs."*
- 8) If you arrange eggs in proper packaging (well protected with manufacturing and expiry date), do you think you can sell eggs with higher price?
 - Packaging and labeling should be implemented by producers.

Date/Time: 22DEC2016 / 11:40

Type of respondents: Retailer

Interview location: Hong Kong market, Thimphu

Respondents Details

Name: Mr. Tshering Dorji (owner)

Retailer shop: Asha General shop.

Contact: 77471894

- 1) From where you purchased eggs?
 - *"I purchased eggs from Tsirang."*
- 2) What is the cost of the eggs you purchased from farms/dealers?
 - Nu. 1350 per carton.
- 3) What is the price do you sell to your customers?
 - Nu. 230 per tray.
 - Nu. 1500 per carton.
- 4) How do you setup your eggs prices?
 - The price is set based on purchasing rate from dealers.
- 5) If the government announces/setup a uniform price for eggs, will this affect your business and is it a good idea or not?
 - *"It will hamper my business. However, if the eggs consistently supplied in the market then a uniform price is acceptable."*
- 6) On average how many eggs do you sell per week?
 - 4-5 cartons per week.
- 7) If the eggs cannot be sold and got spoiled, what would you normally do?
 - There are no spoiled eggs.
- 8) If you arrange eggs in proper packaging (well protected with manufacturing and expiry date), do you think you can sell eggs with higher price?
 - Packaging and labeling should be implemented by producers.

Date/Time: 22DEC2016 / 15:42

Type of respondents: Retailer (Middle class grocery store)

Interview location: Motithang, Thimphu, Bhutan

Respondents Details

Name: -

Retailer shop: Shop NO. 7

Contact: 17603872

- 1) From where you purchased eggs?
 - The shop purchased the eggs from Tsirang.
- 2) What is the cost of the eggs you purchased from farms/dealers?
 - Nu. 1300 per carton for the big size eggs.
- 3) What is the price do you sell to your customers?
 - Nu. 90 per dozen (12nos of eggs).
 - Nu.220 per tray.
- 4) How do you setup your eggs prices?
 - Egg price is based on purchasing rate.
- 5) If the government announces/setup a uniform price for eggs, will this affect your business and is it a good idea or not?
 - *"It is a good idea to have a uniform price and this will not affect my business."*
- 6) On average how many eggs do you sell per week?
 - 5-10 cartons per week.
- 7) If the eggs cannot be sold and got spoiled, what would you normally do?
 - There is no spoiled egg.
- 8) If you arrange eggs in proper packaging (well protected with manufacturing and expiry date), do you think you can sell eggs with higher price?
 - Packaging and labeling should be implemented by producers.

Date/Time: 22DEC2016 / 16:21

Type of respondents: Retailer (Youth Cooperative)

Interview location: Memorial Chorten, Thimphu, Bhutan

Respondents Details

Name: -

Retailer shop: YBC

Contact:

- 1) From where you purchased eggs?
 - YBC (Memorial Chorten) purchased eggs from YBC in centenary market Thimphu.
- 2) What is the cost of the eggd you purchased from farms/dealers?
 - *"I am not aware about the prices because I buy from the YBC (Centenary farmers market)."*
- 3) What is the price do you sell to your customers?
 - Nu. 220 per tray.
 - Nu. 1500 per carton.
- 4) How do you setup your eggs prices?
 - Our prices are set up by the YBC management board.
- 5) If the government announces/setup a uniform price for eggs, will this affect your business and is it a good idea or not?
 - No comments.
- 6) On average how many eggs do you sell per week?
 - 5-10 cartons per week.
- 7) If the eggs cannot be sold and got spoiled, what would you normally do?
 - There is no spoiled egg.
- 8) If you arrange eggs in proper packaging (well protected with manufacturing and expiry date), do you think you can sell eggs with higher price?
 - It is a good idea to have proper packaging, but we have to see favorable possibility in the market.

Date/Time: 22DEC2016 / 17:10

Type of respondents: Retailer

Interview location: Maintown Thimphu, Bhutan

Respondents Details

Name:

Retailer shop: Tshering general shop

Contact:

- 1) From where you purchased eggs?
 - *"I purchased eggs from Tsirang dealers."*
- 2) What is the cost of the eggs you purchased from farms/dealers?
 - Nu. 1300 per cartons.
- 3) What is the price do you sell to your customers?
 - Nu. 80 for 8 eggs with plastic packaging from chocolate eggs.
 - Nu. 150 for 16 eggs with plastic packaging from chocolate eggs.
 - Nu.250 per tray.
- 4) How do you setup your eggs prices?
 - *"I set up egg price from purchasing rate."*
- 5) If the government announces/setup a uniform price for eggs, will this affect your business and is it a good idea or not?
 - No comments
- 6) On average how many eggs do you sell per week?
 - 5-6 cartons per week.
- 7) If the eggs cannot be sold and got spoiled, what would you normally do?
 - There is no spoilage.
- 8) If you arrange eggs in proper packaging (well protected with manufacturing and expiry date), do you think you can sell eggs with higher price?
 - *"It is a good idea to have good packaging and labeling. I think it is possible to sell at a higher price since I have already had some experiences."*
 - *"Many customers also pay special interest on the packaging."*

Appendix F
(Consumers Interviews)

Date/Time: 22DEC2016 / 13:26

Type of respondents: Consumers (Individual - Body Builder)

Interview location: Centenary Farmer's Market, Thimphu

Respondents Details

Name/Age: Mr. Sither / 50 years old

Members in Family: 1

Location: Babesa

1) From where do you normally buy eggs and why?

- *"Normally, I purchased the eggs from open markets based on my convenience."*

2) How many egg do you normally buy per month?

- *"I purchased 5-6 tray per month, and I consumed 5-6 eggs per day."*

3) Are you satisfied with the egg price today?

If yes, how much would you think is expensive? If no how much would you wish the price to be?

- Nu. 200 per tray is a good price and Nu. 340 per tray is expensive for me.

4) Do you cook by yourself? - Yes, I cook food by myself.

If yes, what are the menus? - Egg pouch, boiled eggs, and fried eggs.

5) How do you choose the egg?

- 1st priority: By Quality
- 2nd priority: By Price
- 3rd priority: By Size - It is hard to see the size since it is covered by a cardboard.

6) If eggs are sold with proper packaging at a higher price of Nu20.-Nu40., would you be willing to buy these eggs?

- *"I am willing to pay the extra cost for packaging, if the eggs are well packaged with good labeling."*

7) What would you like to suggest to egg producers?

- Please feed your layers with good quality feed, so that they lay bigger eggs.

Personal comments

- There are 200 body builders in Thimphu and they all required eggs as protein source.

Date/Time: 22DEC2016 / 13:48

Type of respondents: Consumers (Individual)

Interview location: Centenary Farmer's Market, Thimphu

Respondents Details

Name/Age: Mr. Kinley / 46 year

Members in Family: 4

Location: Changzamtog, Thimphu

1) From where do you normally buy eggs and why?

- "I normally purchased eggs from YBC (centenary market) because it is cheap."

2) How many egg do you normally buy per month?

- "I buy 2 trays per month."

3) Are you satisfied with the egg price today?

If yes, how much you think it is expensive? If no how much you wish the price to be?

- "I am happy with the present price, Nu. 200 per tray, and I think Nu. 280 - Nu. 300 per tray is expensive."

4) Do you cook by yourself? - Yes.

If yes, what are the menus? - Boiled and fried eggs.

5) How do you choose the egg?

- 1st priority: By Price
- 2nd priority: By Size - Difficult to see the size of eggs since it is covered by a cardboard.
- 3rd priority: By Quality - Difficult to see the size of eggs since it is covered by a cardboard.

6) If eggs are sold with proper packaging at a higher price of Nu20.-Nu40., would you be willing to buy these eggs?

- No comments.

7) What would you like to suggest to egg producers?

- No comments.

Date/Time: 22DEC2016 / 13:55

Type of respondents: Consumers (Individual)

Interview location: Centenary Farmer's Market, Thimphu

Respondents Details

Name/Age: Mr. Rinchen Dorji / 44 years old

Members in Family: 6

Location: Changzamtog, Thimphu

1) From where do you normally buy eggs and why?

- *"I purchased eggs from YBC at centenary market because of the price is cheaper."*

2) How many egg do you normally buy per month?

- "I buy 3 trays per month."

3) Are you satisfied with the egg price today?

If yes, how much you think it is expensive? If no how much you wish the price to be?

- *"Yes and I think Nu. 270 – Nu. 300 per tray is expensive."*

4) Do you cook by yourself? - No, my wife does the cooking.

If yes, what are the menus? - Fried eggs and boiled eggs.

5) How do you choose the egg?

- 1st priority: By Price
- 2nd priority: By Size – *"I think small eggs have a better nutrition compared to big sized eggs."*
- 3rd priority: By Quality

6) If eggs are sold with proper packaging at a higher price of Nu20.-Nu40., would you be willing to buy these eggs?

- If the eggs are packaged well with labels and are safe to consume, I am willing to pay the extra price.

7) What would you like to suggest to egg producers?

- No comments.

Date/Time: 22DEC2016 / 14:20

Type of respondents: Consumers (Individual)

Interview location: YBC memorial chorten, Thimphu

Respondents Details

Name/Age: Ms.Lhayul Kimu / 13

Members in Family: 4

Location: Memorial Chorten, Thimphu

1) From where do you normally buy eggs and why?

- *"I buy eggs from YBC since the price is cheaper and the shop is near to my house."*

2) How many egg do you normally buy per month?

- *"I purchased 1-2 tray per month."*

3) Are you satisfied with the egg price today?

If yes, how much you think it is expensive? If no how much you wish the price to be?

- No comments.

4) Do you cook by yourself? - *"Sometimes I cook at home."*

If yes, what are the menus? - Fried eggs, soup, noodles and fried rice.

5) How do you choose the egg?

- 1st priority: By Quality - *"I choose eggs by quality hygiene."*
- 2nd priority: By Price
- 3rd priority: By Size

6) If eggs are sold with proper packaging at a higher price of Nu20.-Nu40., would you be willing to buy these eggs?

- If eggs are packed well with good labeling, I am willing to pay extra price by considering the food safety.

7) What would you like to suggest to egg producers?

- No comments.

Date/Time: 22DEC2016 / 15:00

Type of respondents: Consumers (Individual)

Interview location: BCOOP main town, Thimphu

Respondents Details

Name/Age: Mr.Tshering / 26

Members in Family: 2

Location: Olakha, Thimphu

1) From where do you normally buy eggs and why?

- *"I normally buy eggs from BCOOP because it is cheap and have good quality."*

2)How many egg do you normally buy per month?

- *"I purchased 2 trays per month."*

3) Are you satisfied with the egg price today?

If yes, how much you think it is expensive? If no how much you wish the price to be?

- *"Yes, I think egg is expensive when it costs Nu. 270-300 per tray."*

4) Do you cook by yourself? - Yes.

If yes, what are the menus? - Omelet, boiled and egg curry.

5) How do you choose the egg?

- 1st priority: By Price
- 2nd priority: By Size
- 3rd priority: By Quality

6) If eggs are sold with proper packaging at a higher price of Nu20.-Nu40., would you be willing to buy these eggs?

- *"Yes, I am willing to pay the extra price."*

7) What would you like to suggest to egg producers?

- Please produce good quality eggs with a present of manufacturing date.

Date/Time: 22DEC2016 / 15:30
Type of respondents: Consumers (Individual)
Interview location: Main town,Thimphu

Respondents Details

Name/Age: Ms. Ugyen Zangmo / 22

Members in Family: 3

Location: Changzamtog,Thimphu

- 1) From where do you normally buy eggs and why?
 - *"I buy eggs from BCOOP because it is cheap."*

- 2)How many egg do you normally buy per month?
 - *"I buy 1 tray per month."*

- 3) Are you satisfied with the egg price today?
If yes, how much you think it is expensive? If no how much you wish the price to be?
 - Yes and Nu. 300-400 per tray is expensive.

- 4) Do you cook by yourself? - Yes.
If yes, what are the menus? - Boiled eggs, stir fried noodle, fried eggs and curry.

- 5) How do you choose the egg?
 - 1st priority: By Size
 - 2nd priority: By Price
 - 3rd priority: By Quality

- 6) If eggs are sold with proper packaging at a higher price of Nu20.-Nu40., would you be willing to buy these eggs?
 - *"Yes, I am willing to pay the extra price."*

- 7) What would you like to suggest to egg producers?
 - No comments.

Date/Time: 22DEC2016 / 15:50

Type of respondents: Consumers (Restaurant - Owner)

Interview location: Thimphu

Respondents Details

Name/Age: Mr. Tshering Dorji / 34

Restaurant: Yangmo

Staffs working in the business: 4

Location: Main town, Thimphu

1) From where do you normally buy eggs and why?

- *"I buy eggs from BCOOP because it is near to my restaurant."*

2) How many egg do you normally buy per month?

- *"Normally, I purchased 10- 15 trays per month."*

3) How do you check egg quality before purchase them?

- *"I check egg quality from the size and spoilage."*

4) Are you satisfied with the egg price today? Yes

If yes, how much do you think is expensive? If no how much would you wish the price to be?

- Egg is expensive when it costs Nu. 250-260 per tray.

5) Since egg price fluctuates, how do you manage to get egg at favorable price?

- So far the price is acceptable.

6) Do you have special menus for eggs?

- *"Our menus are omelet, pouch, boiled, fried eggs, and egg curry."*

7) If there are no eggs in the market, what will be your alternative substitute for eggs?

- No comments.

8) What would you like to suggest to egg producer?

- No comments.

Personal comment

- Our Bhutan eggs are better than eggs from India

Date/Time: 22DEC2016 / 16:20
Type of respondents: Consumers (Restaurant)
Interview location: main town,Thimphu

Respondents Details

Name/Age: Mr. Arpam sharma / 21
Restaurant: Sipsoo restaurant & bar
Staffs work in the business: 5
Location:Main town,Thimphu.

- 1) From where do you normally buy eggs and why?
 - *"I normally purchase eggs from nearby grocery shop."*
- 2)How many egg do you normally buy per month?
 - "I purchased around 7 trays per month."
- 3) How do you check egg quality before purchase them?
 - No comments.
- 4) Are you satisfied with the egg price today?
If yes, how much do you think it is expensive? If no how much you wish the price to be?
 - *"I am happy with the current price, and Nu.270 per tray is considered to be expensive."*
- 5) Since egg price fluctuates, how do you manage to get egg at favorable price?
 - "I accept any prices from retailers."
- 6) Do you have special menus for eggs?
 - Pouch, omelet, and egg fried rice.
- 7) If there is no eggs in the market, what will be your alternative source for eggs?
 - No comment.
- 8) What would you like to suggest to egg producer?
 - "I would like to have bigger size eggs with lower price. Bloody spot and spoiled eggs need to be screened out before entering into the market."

Date/Time: 22DEC2016 / 16:40
Type of respondents: Consumers (Restaurant)
Interview location: Thimphu

Respondents Details

Name/Age: Ms. Yeshey Choden(owner) / 33

Restaurant: Ama Resturant

Staffs work in the business: 13

Location: Hong Kong market

1) From where you normally buy eggs and why?

- *"I normally buy eggs from the Jigmina farm, Thimphu because it is fresh."*

2)How many egg you normally buy per month?

- *"I buy 7 trays per month"*

3) How do you check egg quality before purchase them?

- No comments.

4) Are you satisfied with the egg price today?

If yes, how much you think it is expensive? If no how much you wish the price to be?

- *"I accept the current egg price, Nu. 214 per tray, and I would not accept the price if it goes up to Nu. 300 per tray."*

5) Since egg price fluctuates, how do you manage to get egg at favorable price?

- *"I can manage to get the acceptable egg price."*

6) Do you have special menus for eggs?

- Omelet, egg scramble, pouch, soup and naan.

7) If there is no eggs in the market, what will be your alternative source for eggs?

- No comments.

8) What would you like to suggest to egg producer?

- No comments.

Date/Time: 22DEC2016 / 17:00
Type of respondents: Consumers (Restaurant)
Interview location: Thimphu

Respondents Details

Name/Age: Ms.Krishna / 38
Staffs work in the business: 4
Restaurant: Kuen Khor restaurant.
Location: Zangto Pelri,Thimphu

- 1) From where do you normally buy eggs and why?
 - *"I buy eggs from nearby grocery shop."*
- 2)How many egg do you normally buy per month?
 - *"I buy 5 trays per month."*
- 3) How do you check egg quality before purchase them?
 - *"I prefer big size eggs."*
- 4) Are you satisfied with the egg price today?
If yes, how much do you think it is expensive? If no how much you wish the price to be?
 - *"I am happy with the current egg price, Nu.220 per tray, but not Nu. 250 per tray."*
- 5) Since egg price fluctuates, how do you manage to get egg at favorable price?
 - It is manageable.
- 6) Do you have special menus for eggs?
 - Egg pouch, omelet, fried rice and soup.
- 7) If there are no eggs in the market, what will be your alternative substitute for eggs?
 - No comments.
- 8) What would you like to suggest to egg producer?
 - No comments.

Date/Time: 22DEC2016 / 17:20
Type of respondents: Consumers (Restaurant)
Interview location: Thimphu

Respondents Details

Name/Age: Ms. Chador Wangmo (owner)/ 22
Restaurant: Sunlight Restaurant.
Staffs working in the business: 7
Location: Zangto pelri complex.

- 1) From where do you normally buy eggs and why?
 - *"I buy eggs from Norbu grocery shop because it is convenient."*
- 2) How many egg do you normally buy per month?
 - *"I buy 5 trays per month at Nu.280 per tray."*
- 3) How do you check egg quality before purchase them?
 - *"I prefer big size eggs."*
- 4) Are you satisfied with the egg price today?
If yes, how much do you think it is expensive? If no how much you wish the price to be?
 - *"I am happy with the current price, but not Nu. 300 per tray."*
- 5) Since egg price fluctuates, how do you manage to get egg at favorable price?
 - It is manageable.
- 6) Do you have special menus for eggs?
 - Pouch, Stir fried noodle, Egg curry, Thukpa, Koka and soup.
- 7) If there are no eggs in the market, what will be your alternative substitute for eggs?
 - No comments.
- 8) What would you like to suggest to egg producer?
 - No comments.

\Date/Time: 22DEC2016 / 17:40

Type of respondents: Consumers (Restaurant)

Interview location: Thimphu

Respondents Details

Name/Age: Mr.Pasang(owner) / 36

Restaurant: Au passangs cafe

Staffs working in the business: 2

Location: Norzin lam Thimphu

1) From where do you normally buy eggs and why?

- *"I normally purchase eggs from Ugyen General shop because it is convenient and they provide credit system."*

2)How many egg do you normally buy per month?

- *"I buy 4 cartons per month."*

3) How do you check egg quality before purchase them?

- *"I check the quality by egg candling method."*

4) Are you satisfied with the egg price today?

If yes, how much do you think it is expensive? If no how much you wish the price to be?

- Nu.257 per tray or Nu.1800 per carton is acceptable, but not Nu. 350-370 per tray.

5) Since egg price fluctuates, how do you manage to get egg at favorable price?

- It is manageable.

6) Do you have special menus for eggs?

- Cakes.

7) If there are no eggs in the market, what will be your alternative substitute for eggs?

- *"I can make cake without egg."*

8) What would you like to suggest to egg producer?

"I need fresh eggs with details and labeling on the package."

