Post-Production, Socio-economics and Policy

Honey Value Chain: linking smallholder farmers to market in Bhutan

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ABSTRACT

The study objectives were to understand the functions, constraints, and future opportunities of pro-poor honey value chain in Bhutan. Six *dzongkhags* (districts) and 12 *gewogs* (blocks) covering 120 households were purposively sampled. Primary data was collected using semi-structured questionnaire and focus group discussions. Over 80% of respondents attended trainings and had improved skills to take-up beekeeping in an accelerated mode. In five subtropical districts, the average honey production of *Apis cerana* honeybees were 1.66kg and 5.1kg, for traditional and improved hive, respectively. The costs of production per kg honey were Nu. 228 and Nu. 223, for *Apis mellifera* and *Apis cerana*, respectively. The average selling price of locally produced *Apis mellifera* honey in Thimphu was Nu. 727 per kg honey, which was twice the price for Dabur honey imported from India but lower than the locally produced *Apis cerana* honey. *Apis mellifera* honey offered a maximum profit margin of 39% to wholesaler and retailers in Thimphu while the maximum profit margin of 43% for *Apis cerana* honey was received by retailers and roadside vendors. The study concluded that the higher price of honey offers opportunity to produce high value honey from *Apis cerana* and *Apis mellifera*. Constraints to beekeeping were lack of awareness on markets and price, limited business management skills, less knowledge on value-addition, weak linkages with markets and input suppliers, and inadequate basic infrastructure.

INTRODUCTION

The subtropical districts of Bhutan are home to many species of honeybees such as *Apis dorsata, Apis laboriosa, Apis florea, Apis cerana* and *Trigona* species (Tamang 2007). Smallholder beekeepers have successfully hived *Apis cerana* and *Trigona* species of honeybees for generations to produce honey. In temperate Bhutan, Bumthang *dzongkhag* (district) has been in the forefront to rear *Apis mellifera* on a commercial scale.

Bhutan has abundant bee flora in the natural vegetation, fruit, and vegetable crops. These crops bloom during different seasons of the year and sustain honeybee population and honey production. Presence of honeybees in the locality is often considered as a good omen by the Bhutanese as they are believed to provide bountiful crop harvest and help families to maintain good health. As of now, quantity of honey produced especially from *Apis cerana* honeybees is minimal although the production trend is improving over the years. The production is expected to increase further owing to little resources required for beekeeping and continuous interventions from government agencies and international donors. In particular, the International Centre for Integrated Mountain Development (ICIMOD) and Department of Livestock initiated and reinforced improved management of *Apis cerana* honeybees in southern districts of Bhutan since 2006. Efforts were made to build the capacity of potential beekeepers in different aspects of beekeeping and honey production. The past pilot community based honey village approach to promote honey production using improved hiving technology has been a success. Apart from increased honey production, interventions have broadened the horizon of thinking and beekeepers are beginning to realize that beekeeping can be a potential income generating activity. Therefore, many have now chosen to increase the number of improved hives to enhance honey production for better income. Despite good efforts to improve beekeeping in Bhutan, little information is available on production, processing and marketing of honey and how best beekeeping could be improved and sustained to increase household income. Therefore, this study was undertaken to gain deeper understanding of entire honey value chain, constraints, and future opportunities aimed at developing a robust pro-poor honey value chain. The honey value chain study was conducted for *Apis cerana* and *Apis mellifera*.

MATERIALS AND METHOD

Study sites

This study was conducted in six *dzongkhag*s and 12 *gewogs* (blocks) of Bhutan (Table 1). Within the six *dzongkhag*s, *gewogs* and households were purposively selected based on criteria: Farmers have long tradition of beekeeping, Farmers have interest to expand their activities to enhance income, and beekeeper groups have been formed and improved hiving technology promoted both for *Apis cerana* and *Apis mellifera*.

Table 1 *Dzongkhags, gewogs* and number of households covered by honey value chain study.

Dzongkhag	*Gewog*		Total households engaged in beekeeping (no.)	Households sampled (no.)	Households interviewed (%)
Bumthang	Chumi	Chokor	53	20	38
Sarpang	Chuzom	Jigmecholing	132	20	15
Tsirang	Patshaling	Dunglagang	99	20	20
Dagana	Tshendegang	Tashiding	70	20	28
Chukha	Darla	Lokchina	127	20	16
Samtse	Dorokha	Denchuka	171	20	12

Data collection

Data were collected in multiple stages. Potential beekeepers in selected *gewogs* were visited by researchers and local extension agents. For group discussion, more than 20 beekeepers including women were selected and consulted from each *gewog*. Among 20 beekeepers, 10 beekeepers were selected at random for interview.

Data were collected from both primary and secondary sources. The primary data were collected using semi-structured questionnaire, focused group survey, and key informant discussions with actors along the honey value chain. Group discussions were held to assess gender situation among beekeeping households, change in farming system, constraints faced in enhancing honey production and marketing, and seek suggestions to improve the overall honey value chain. Informal discussion was also held with key informants mainly the chairman of beekeepers' group and village elderly/*Gup* (village headman). Informal discussions were also held with extension agents to validate information.

Data analysis

Data were processed in Microsoft Excel program. Opinions were expressed in percentages.

RESULTS AND DISCUSSION

Beekeeping tradition and use of honey

Beekeeping has been a long tradition for most of the households in the study area. However, keeping honeybee was only a part-time job. The only effort of beekeepers was to make and clean hives before the arrival of migrating bee and harvest honey periodically.

Unlike in other countries such as Zambia and Uganda, where honey is used for brewing liquor and wines (Ndyomugyenyi et al. 2010; Simukoko 2008), honey in Bhutan is mostly consumed as it is or used as sweetener. Honey has been long recognized by the local people as medicine to cure sore throat, chickenpox, stomach pain, foot and mouth diseases of livestock, wounds, and so on. The Indian Council for Agriculture Research (ICAR) (1990) mentioned that the Indian system of medicine uses honey extensively as a vehicle for drugs. Further, Dorji and Tshering (1999) reported that the oral drenching as well as application of mixture of honey and molasses on lesion is a common method to treat foot and mouth disease of animals in villages. Studies have also shown that glucose oxidase enzyme present in honey has antibacterial property. This combined with low pH and osmotic effect of honey is effective in cleaning infection and promoting healing (Molan 1999).

Beekeeping skills and awareness

Most of the respondents (80%, n=52) had attended basic training on beekeeping. Some had even received advanced training on hive making and participated in study visits organized by ICIMOD. These people are now acting as resource persons to train other beekeepers. Enhanced skills and awareness are needed to boost confidence and encourage farmers to take up beekeeping. However, about 20% of respondents had not received such trainings. Some trained beekeepers had lost track of modern beekeeping because of lack of practice.

Bee flora at the homestead

The seasonal crops such as maize, vegetable and fruit trees provide nectar and pollen to bees most of the year in subtropical districts. Bees in turn help plants by providing pollination services essential for production of viable seeds for sustainable agriculture (API 2006). However, there was decrease in domestic bee flora especially buckwheat and mustard cultivation in all sampled districts. This was mainly due to availability of cooking oil and edible flour in the local shops and encroachment of dry and wet land by other land use. However, majority (61%) of respondents felt that the bee flora in wild had either remained same or increased over the years. Bhutan's strong environment protection ethics have been a boon to conserve not only wild flora but also wild fauna including honeybees. This may help in building resilience to adverse effect of climate change.

Apis cerana honey production and income

A total of 3,174 households in five southern districts *viz.* Chukha, Dagana, Samtse, Sarpang, and Tsirang, owned 7,378 beehives of all types (wall, box, log, and improved). This constituted about 10% of total households in these districts. Estimated honey production in all districts was about 12MT and generated a gross income of Nu 6.0 M annually (if all honey is sold). In pilot *gewogs* where improved hiving technology was introduced, the income from honey ranged from Nu. 2,964 to Nu. 17,700 per annum, which is a substantial leap from Nu. 773 per household reported by Tamang (2007).

In the sampled households, 37% of total hives were improved movable frame hives and rest were traditional hives. Within traditional hives, 88% of households had *Apis cerana* bee colonies and rest 12% had *Trigona* (drummer bees) colonies. Average honey production was 1.66kg (n=15) from traditional hives and 5.1kg (n=10) from movable frame hives. Similarly, Chimi et al. (2016) reported that *Apis cerana* honey yields are 2.68kg and 5.41kg per hive for traditional and improved hives, respectively.

Apis mellifera honey and income

Bumthang is the only district in Bhutan where *Apis mellifera* beekeeping is popular. In total, 53 households reared these honeybees. The beekeepers owned 1,234 beehives in total. The average honey production from each hive was about 63kg (n=100). In total, 21MT of honey was produced in 2015 with an annual turnover of Nu. 6.83M.

Honey extraction and processing

The prevailing method of honey extraction for *Apis cerana* was squeezing the comb and draining or filtering it through a clean cloth. About 76% (n=67) of respondents reported that honey is extracted using this method (Figure 1).

Honey was seldom processed to reduce moisture as there were no processing facilities. The practice of heating to melt honey and reduce moisture was not common. However, with knowledge gained, beekeepers harvested only matured capped comb and honey was generally pure.

Honey packaging

About 57% (n=75) of respondents filled the honey in re-used plastic bottle available from liquor shops and about 26% used plastic container purchased from local shops (Figure 2). About 9% of beekeepers used old glass container and 8% used glass bottles that can hold half and quarter kilogram honey. But when middlemen or agents such as Bio-Bhutan procured and bulked honey, it was transported in 30kg capacity plastic containers.

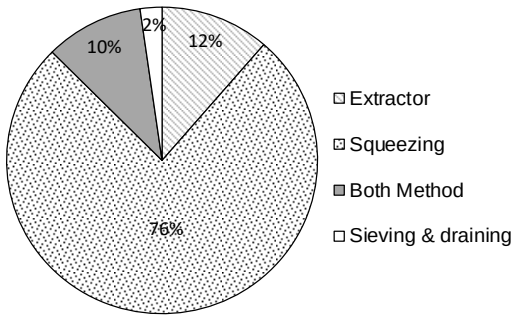

Figure 1 Honey extraction methods for *Apis cerana* honey.

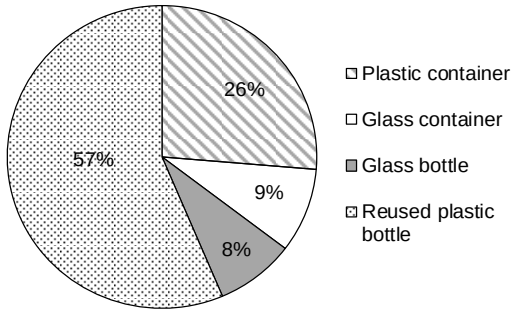

Figure 2 Packaging materials used for *Apis melliphera* honey in Bumthang.

Marketing of honey

The marketing of *Apis cerana* honey was informal with sourcing from spot markets being common. Purchase was usually in an ad-hoc manner from traders, individual buyers, and middlemen or from the open roadside makeshift shops (Figure 3). The maximum quantity (41%) of *Apis mellifera* honey from Bumthang was procured by wholesalers in Thimphu and distributed to many retail shops in Thimphu and Phuntsholing. About 39% of honey was absorbed by local retail shops in Bumthang town and remaining 20% was retained at the cooperative office to meet the demand of high-end consumers.

Domestic market for honey

Most beekeepers reported that there is no dearth of market for honey produced in Bhutan. Further, it is estimated that the domestic market can absorb at least 58MT annually considering the present production of 21MT *A. mellifera* honey, 12MT estimated production of *Apis cerana*/*Trigona* honey, and 25MT imported in 2014 (DRC 2015).

Market competitors and market share for locally produced honey

Dabur brand of honey is the main competitor for honey produced in Bhutan. It is widely distributed across all major towns of Bhutan by wholesalers (eg. Tashi Group of Companies). Of the total estimated consumption of 58MT honey in 2015, it has over 40% market share. Other brand such as Beez Honey and Real Honey from India and Aussie Honey from Australia have about 2% share. Bumthang *A mellifera* honey and local *A cerana* honey have 37% and 21% domestic market share, respectively (Figure 4).

Market information availability and service providers

The majority of beekeepers rarely obtained information on honey marketing from television (TV), newspaper or radio. Limited information on honey production and marketing was obtained through mobile phone contact (47%), face to face contact (29%), and rest through e-mails and post. Linkage between producers, (semi) processor, trader and consumer was reported to be very weak in every front for *Apis cerana* honey. There were weak linkages between individual producers and honey producer group, producers and middlemen, and producers and wholesaler/retailer. However, the producer cooperative and individual producers for *Apis mellifera* honey were better linked and honey production and price fixation were well coordinated but they did not have any formal linkage with wholesalers or retailers.

Market linkages for Apis cerana and Apis mellifera honey

Absence of any short-term or long term contracts between wholesalers or retailers and local honey producers indicated poor linkages between the parties. Similarly, the wholesalers and retailers had less idea in *Apis cerana* honey production belt. The beekeepers' cooperative, Bumthang felt that establishing contract with few wholesalers or retailers might distort the market for honey, resulting in honey hoarding and overpricing during the lean season. Further, trading honey will not be equally distributed. In order to have a functional chain, as many as 46% of vendors or retailers interviewed suggested the need to improve market linkage, product quality, and timely supply of honey to traders. The nonexistence of any contracts between wholesalers /retailers and local honey producers would mean that wholesalers and retailers hold no obligation to the needs and aspirations of the producers. Further, there was no agreed price for honey when middlemen or traders procured from the producers. Hence, producers received a very low price.

Honey production cost and price for local honey

The cost of production for *Apis cerana* honey was estimated at Nu. 223 per kg. For *Apis mellifera* honey, the production cost was estimated at Nu. 228 per kg.

There was a fast increase in the price for honey across five districts and the overall average price was about Nu. 436 per kg. The increasing market price for honey spells a promising outlook for producers who can scale-up production. The farm gate price of *Apis mellifera* honey in Bumthang was Nu. 325 per kg.

Comparative price of imported and local honey

For Dabur Honey, the wholesaler provided 14% commission to the retailers who sold them at maximum retail price (MRP) of Nu. 380 or little less for one kg honey. The average price fetched by the local *Apis mellifera* honey was Nu. 727 per kg. The price is twice the price for Dabur honey at Thimphu retail market and higher than the other imported honey brand but

lower than the locally produced *Apis cerana* honey, which is sold at Nu. 1000 per kg in 2015. It indicates that there is high demand for locally produced honey, which is enjoying a favorable price. Hence it can be a driving force to encourage producers to enhance production.

Honey profit margins

The local retailers or road side shops along Gelephu-Thimphu highway and Gelephu-Trongsa highway were deriving maximum benefit of Nu. 300 over the purchase price and enjoy a profit margin of 43%. For the *Apis mellifera* honey, the wholesaler in Thimphu enjoys a maximum profit margin of about 39% owing to high selling price (Figure 5).

CONCLUSIONS

Although the modern *Apis mellifera* beekeeping is practiced in Bumthang for over two decades, the improved ways of beekeeping for *Apis cerana* honeybees are a recent intervention. The beekeepers of Bumthang are now gearing towards commercial beekeeping with expanded production. But for *Apis cerana* beekeepers, beekeeping as a main income generating activity is unlikely to happen any time soon but enthusiasm of these beekeepers to upscale beekeeping in an improved way is growing. The high price fetched by the locally produced honey (both *melliphera* and *cerana* honey) owing to consumer preference for products from Bhutan's pristine environment, can be an opportunity to develop mountain specific high value honey for international market. The honey value chain and its market linkages for locally produced *Apis mellifera* honey are stronger for *Apis cerana* because *Apis mellifera* honey is produced in marketable quantity of acceptable quality. However, the *Apis cerana* honey is produced in small quantities in isolated pockets of Bhutan, often using traditional hives which makes it difficult to produce clean honey for the formal markets.

The *Apis cerana* beekeepers of Bhutan are yet to understand the value or price consumers are willing to pay for high quality honey, hygienically produced, and properly packaged and labeled products. Hence, the producers are yet to reap the benefits of enhanced honey production for higher income and

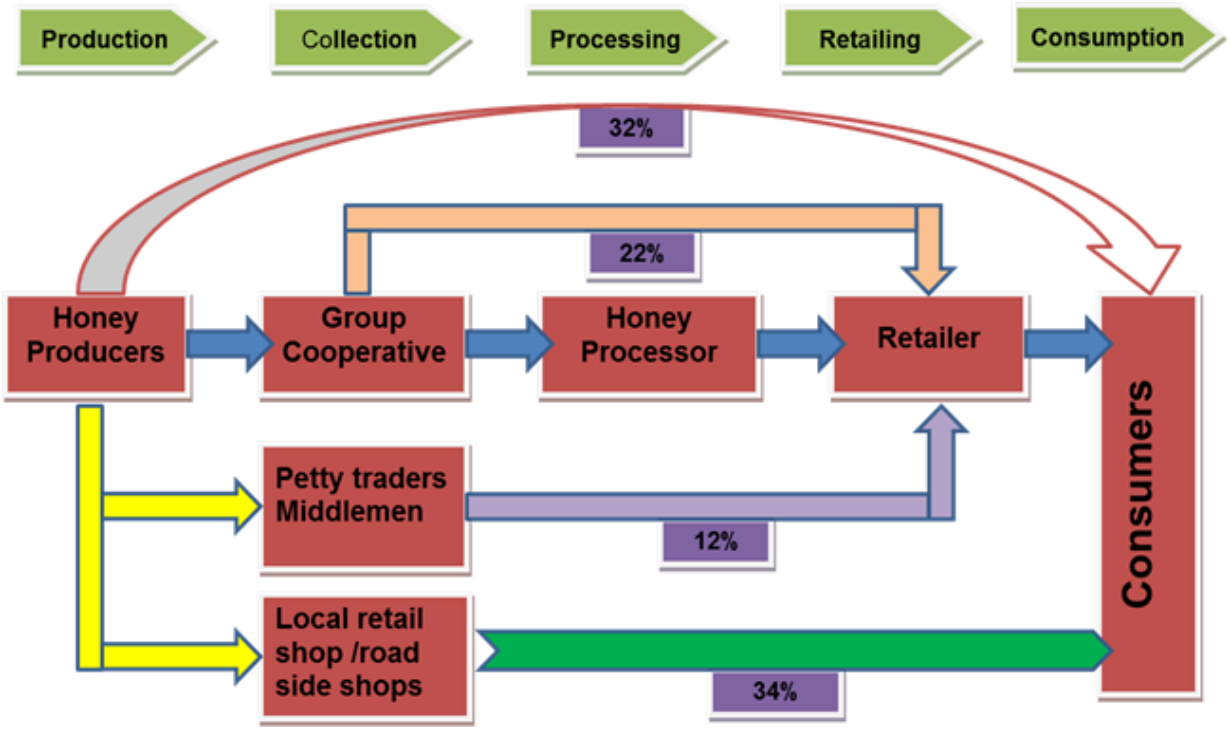

Figure 3 Trade flow of locally produced *Apis cerana* honey.

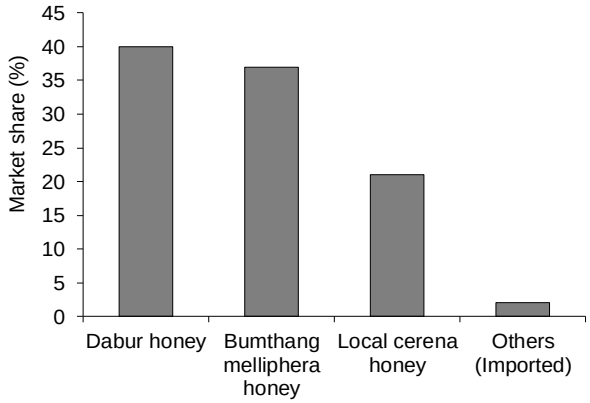

Figure 4 Market share of honey produced and imported.

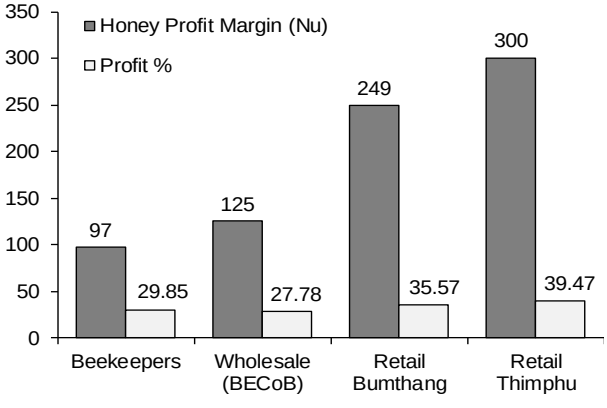

Figure 5 Profit margin of *Apis mellifera* honey.

better livelihoods. The effort of government to produce organic vegetables has steadily improved availability of bee flora in some beekeeping districts, resulting in increased honey production by three folds. Such efforts need to be fostered to enable the beekeeping venture to be taken up in an accelerated mode so that this environment friendly intervention can bring long term benefits.

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